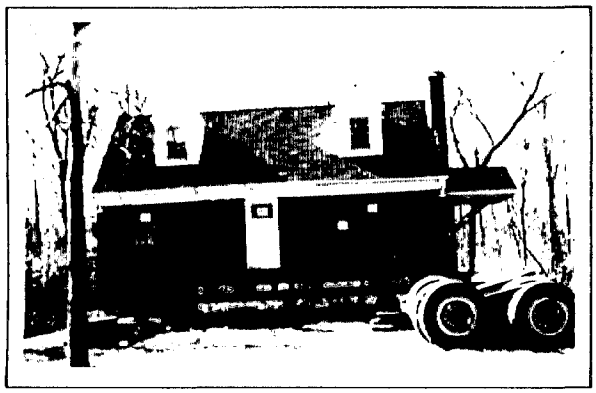
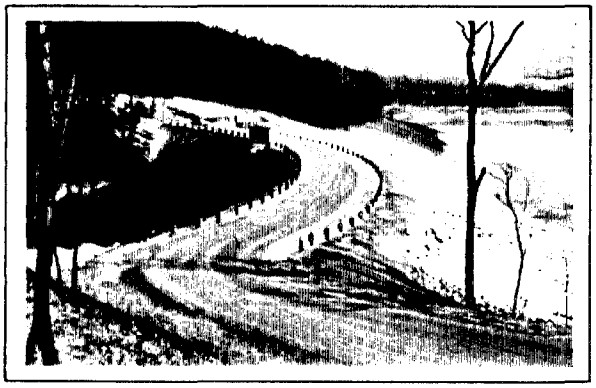
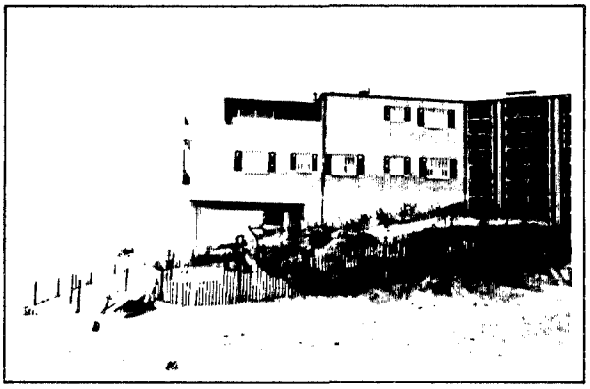
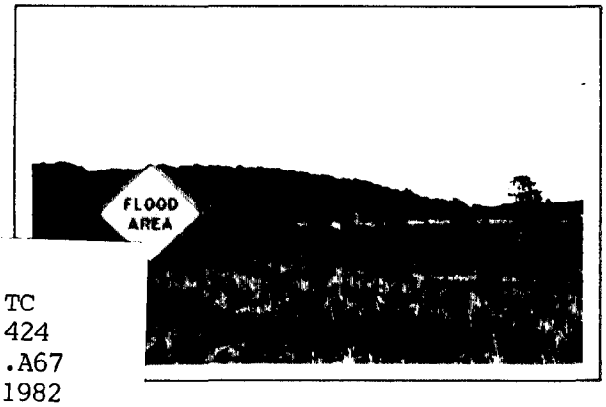
# AN ASSESSMENT OF FLOOD MANAGEMENT ACTIVITIES IN MARYLAND

JANUARY 1982










MARYLAND DEPARTMENT OF NATURAL RESOURCES

# An ASSESSMENT of FLOOD MANAGEMENT

# ACTIVITIES in MARYLAND

**January 1982**

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Funded by the Federal Emergency Management Agency
through the State Assistance Program
(Agreement #EMW-R-0192)

ACKNOWLEDGEMENTS

In addition to those who provided information and review on agency activities, listed with the discussions on their respective agencies, acknowledgement should be extended to the following for generously contributing their knowledge and experience: Leo Bosner, Jane Bullock, Robert Dannecker, Richard Jarman, Jon Kusler, John Seyfert, Jeffrey Smith, Jim Solyst, Helen Stone, and Marguerite Whilden.

Appreciation is given to Vickie Payne, Cindy Smith, Karen Pushkar and Maria Howe for their clerical assistance.

COVER PHOTO CREDITS

Structure being moved in Baltimore County: John Maple

Policeman reading flood gage: Howard County Office of Civil Defense

Rocky Gap Dam spillway: Robert Norton

Floodproofed property, Ocean City, MD: Marguerite Whilden

Flood warning sign: Jon Kusler

The work that provided the basis for this publication was supported by funding under a Cooperative Agreement. The substance and findings of that work are dedicated to the public. The author and publisher are solely responsible for the accuracy of the statements and interpretations contained in this publication. Such interpretations do not necessarily reflect the views of the Government.

TABLE OF CONTENTS

## ABBREVIATIONS USED

### Federal Agencies

| | |
|---|---|
| Corps | U.S. Army Corps of Engineers |
| FEMA | Federal Emergency Management Agency |
| FmHA | Farmers Home Administration |
| FHWA | Federal Highway Administration |
| NOAA | National Oceanic and Atmospheric Administration |
| NWS | National Weather Service |
| SBA | Small Business Administration |
| SCS | Soil Conservation Service |
| USGS | U.S. Geological Survey |
| WRC | Water Resources Council |

### State Agencies

| | |
|---|---|
| DNR | Department of Natural Resources |
| CPA | Capital Programs Administration |
| LPS | Land Planning Services |
| MFS | Maryland Forest Service |
| MGS | Maryland Geological Survey |
| POS | Program Open Space |
| WRA | Water Resources Administration |
| DSP | Department of State Planning |
| SHA | State Highway Administration |

### Regional Agencies

| | |
|---|---|
| SRBC | Susquehanna River Basin Commission |

## EXECUTIVE SUMMARY

### An Assessment of Flood Management Activities in Maryland

This report was prepared by Water Resources Administration, Maryland Department of Natural Resources. Funding was provided through the State Assistance Program of the Federal Emergency Management Agency.

This document provides a description and assessment of flood hazard mitigation responsibilities at the State level and a description of Federal, regional, private and local flood hazard mitigation activities. The findings will be used to improve Maryland's flood management program at the State level, thereby contributing to the goal of reducing flood damages and/or the adverse impacts of flooding.

Three appendixes are attached. The first is a description of flood hazard mitigation responsibilities of State, Federal, regional, private and two local agencies, with individual contact names and relevant publications. The second is a description of flood hazard mitigation activities pertaining to the functions of agencies listed in Appendix A. The third contains pertinent flood management legislation: 1) The Maryland Flood Hazard Management Act of 1976, with Code of Maryland Regulations 08.05.08; and 2) Section 406 of P. L. 93-288, the Federal Disaster Relief Act of 1974.

This document can be used to:

- Inform agencies involved in flood management on the activities of other agencies performing flood management functions.

- Provide a data base and foundation for the Maryland Emergency Management Advisory Council to advise the Governor on the following matters related to flooding:

    1) the assessment of the authorities and responsibilities and the current legal status of Maryland agencies involved in flood management,

    2) the review of coordinating linkages between Federal agencies, State agencies and local jurisdictions involved in flood management in Maryland; and

    3) the determination of the viability of present State flood management programs.

## The State Assistance Program

The State Assistance Program was developed by the Federal Emergency Management Agency (FEMA) to promote an intergovernmental flood hazard mitigation partnership by providing the states with the opportunity to strengthen their role in National Flood Insurance Program (NFIP) flood hazard mitigation activities.[1] In turn, states can assist in increasing their communities' capabilities to develop, implement and administer flood hazard mitigation measures.

Maryland initiated a flood hazard mitigation program in 1933 through the enactment of the Waterway Construction Law (§§8-803, et seq. of the Natural Resources Article). This program evolved over time and resulted in the enactment and implementation of the Flood Hazard Management Act of 1976 (§§8-9A-01 et seq. of the Natural Resources Article).

With a strong program in force, the State has chosen to direct the results of this report towards a refinement of flood hazard mitigation activities in Maryland. The implementation of this assessment will serve to strengthen the State's program and increase Maryland's capability in administering flood hazard mitigation activities which reduce the adverse impacts of flooding.

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[1]Flood hazard mitigation generally refers to an activity which lessens the adverse impact of flooding.

# ASSESSMENT

## Introduction

Through the Flood Hazard Management Act of 1976, the legislative foundation in Maryland for watershed planning for flood management, Maryland has defined five goals for its flood management program:

1) Reduction of existing flood hazards,
2) Prevention of future flood hazards,
3) Adequate emergency preparedness,
4) Preservation of environmental qualities of watersheds and,
5) Reduction of economic and social losses.

To achieve these goals, there is a need for better coordination between agencies which have flood hazard mitigation responsibilities.

The 1981 Maryland General Assembly recognized this need through the creation of the Emergency Management Advisory Council, an advisory group to the Governor for emergency management matters. This Council can be used as a forum for developing and improving State flood hazard mitigation activities, a major aspect of emergency management. For more information on the creation of this Council, see Appendix A, State Planning Discussion.

This assessment provides an organization and classification of exisiting flood hazard mitigation activities for Maryland agencies. The objective of this assessment is to provide a data base of information on existing State flood hazard mitigation activities for use by the Emergency Management Advisory Council. This information should enable the Council to provide for strengthened coordination and communication between agencies, and a stronger State flood management program.

Methodology

To effect this assessment, flood hazard mitigation activities and the agencies involved in performing these activities had to be identified. These agencies were contacted and meetings were arranged at which information was gathered on pertinent activities and suggestions were sought to improve the State's program.

Next, by combining available literature on each agency and the activities of the agencies as described at the meetings, the responsibilities of the agencies were determined. A discussion of the flood hazard mitigation responsibilities of the agencies, relevant publications and contact personnel is contained in Appendix A.

Also, available literature on hazard mitigation and flood plain management in other states was reviewed to gain a better perspective of the State's role. As a result, flood hazard mitigation activities are classified into six categories for the purpose of this report. The description of these six categories can be found in Appendix B. The categories are:

1) Disaster Preparedness and Assistance,
2) Non-Structural Flood Damage Reduction,
3) Structural Flood Control Works
4) Development and Redevelopment Policies,
5) Research, and
6) Information and Education

From this information, an overall perspective of flood hazard mitigation activities in Maryland was developed.

Twenty-two Federal, State and regional agencies are included in this assessment. The local governments and local civil defense

offices also play a major role in flood hazard mitigation. A description of two local civil defense offices were included for their exemplary flood warning systems.

## Findings

There are a large number of agencies with responsibilities for varied aspects of flood hazard mitigation in Maryland. These agencies are all working towards one common goal - the reduction of flood damages. However, the large amount of involved agencies creates a complex structure which can inhibit and restrict the free flow of information on flood hazard mitigation activities from one agency to another.

The major finding of this assessment is the need for strengthened coordination and communication between and among agencies. Improving coordination and communication can provide for improved preparedness and response to flood disasters, more effective mitigation efforts and practical post-disaster long term recovery planning. In addition, there are existing flood hazard mitigation programs at the Federal, State and local level which should be strengthened. The enhancement of these activities will deliver a stronger and more coordinated State flood hazard mitigation program.

The Water Resources Administration, through major involvement in flood management activities, should work with the Emergency Management Advisory Council, using the findings of this assessment, to encourage the development of stronger coordination and communication between agencies with flood hazard mitigation responsibilities. These efforts would be consistent with the mission and goals of the Emergency Management Advisory Council.

## Strenghthened Coordination and Communication

Flood hazard mitigation agencies in Maryland must work in concert to achieve the common goal of flood damage reduction. To accomplish this, certain agencies must take lead roles in strengthening coordination and improving communication among agencies.

In assessing flood hazard mitigation activities in Maryland, agency activities were classified according to the six previously discussed categories (See Appendixes A and B). From this classification, two major categories of flood hazard mitigation activities emerged for agencies in Maryland. These two types are pre-flood and post-flood hazard mitigation activities. Pre-flood activities can be defined as activities to reduce the potential damages of a flood before a flooding situation occurs. Non-structural flood damage reduction, structural flood control works, development and redevelopment policies, research, and information and education are pre-flood activities. Examples include land use regulations, acquisition of damage prone structures, flood-proofing, hazard awareness, technical studies and flood control projects

Post-flood activities can be defined as measures to reduce damages or lessen the impact when a flooding situation is imminent or after a flood disaster has occurred. Disaster preparedness and assistance is a post-flood hazard mitigation activity. Examples include flood forecasting, evacuation planning, flood emergency measures and disaster relief.

The assessment revealed a natural division of activities between agencies (See Table 1, Federal agencies and Table 2, State agencies). The Maryland Emergency Management and Civil

Defense Agency maintains the lead involvement in post-flood hazard mitigation activities (See Table 3). This is consistent with their historical responsibilities, especially as the Governor's representative for disaster response during gubernatorially declared flood disasters.

The Water Resources Administration exemplifies the most comprehensive involvement in pre-flood hazard mitigation activities (See Table 3), particularly in relation to the provisions of the Flood Hazard Management Act of 1976. Given this major involvement, the Water Resources Administration should strengthen its role by improving coordination and communication between agencies. This can be accomplished by working through a legislated medium--the Maryland Emergency Management Advisory Council.

The membership of this Council consists of representatives from State agencies, County and municipal organizations, and professional and volunteer fire and rescue organizations. The Council is chaired by the Maryland Adjutant General. Thus far, the work plan of the Council includes the identification and priority ranking of State emergency risks and a review of emergency management statutory responsibilites.

The findings of this assessment are closely linked with certain goals of the Council, as identified in their Statement of Mission and Goals; i.e.,

> "Assess authorities and responsibilities and current legal status of Maryland emergency management capabilities and
>
> Review the coordinating linkages of Maryland Emergency Management and Civil Defense Agency with federal, state and local jurisdictions."

## Existing Flood Hazard Mitigation Activities

In addition to the Council, there are other activities existing at the Federal, State and local level which can be enhanced through improved coordination and communication. This enhancement can lead to a stronger State-wide flood hazard mitigation program. These activities include the Maryland Flood Hazard Management Act of 1976, the National Flood Insurance Program, 406 Planning, Post-Disaster Hazard Mitigation Teams, and the institution of local flood warning systems.

### Flood Hazard Management Act of 1976

The Flood Hazard Management Act (FHMA) of 1976 (the law is contained as Appendix C and a description may be found in Appendix A, Water Resources Administration) sets up a State and local program for watershed planning and the implementation of capital projects for flood management. However, sufficient funding is necessary to accomplish the planning and project phases.

The 1980 amendents to the law authorized $7.5 million in bond revenue for implementation of capital projects. Amendments in 1981 allowed this money to be used for technical studies. These studies serve as the data base for the planning requirements of the Act.

With the designation of the priority watersheds and the use of this money in accomplishing the technical studies necessary to develop flood management plans, additional funds will be needed for the capital projects which are contained in the local flood management plans. The law and implementing regulations encourage acquisition and removal of flood prone

structures, while recognizing that structural flood control measures may be required in certain situations.

The 1982 Maryland General Assembly authorized an additional $1.5 million in bond funds to support the FHMA. Financial support must be continued for the funding to accomplish the planning and project efforts necessary to reduce flood damages.

National Flood Insurance Program

The National Flood Insurance Program (See Appendix A, Federal Emergency Management Agency and Water Resources Administration, Flood Management Division) represents the most comprehensive program and dominant force in flood plain management efforts on a national basis. The State of Maryland through Water Resources Administration has worked closely with the Federal Emergency Management Agency in coordinating the implementation of the flood insurance program at the local level.

The State should continue to strongly support the National Flood Insurance Program. All flood prone communities in Maryland should enter the Regular phase of the flood insurance program. It is in this phase that the community must require all new construction and substantial improvements in identified areas of flood hazard to be elevated or flood proofed to the level of the base flood. The Emergency phase does not contain these strong requirements. Both FEMA and the State of Maryland should continue to work together to ensure that natural hazard mitigation measures are effectively implemented as a condition for disaster assistance.

State Assistance Program

The State Assistance Program can be used implement the results of this assessment and further strengthen Maryland's flood hazard mitigation program. Increased levels of awareness of the mutual flood hazard mitigation objectives among agencies and individuals can be promoted through information, training and education. This in turn can lead to stronger coordination and communication among agencies with common goal of reducing flood damages.

Information, training and education programs can be sponsored by the State in the form of workshops and seminars for Federal, State and local government personnel. These workshops and seminars can provide a forum for increased cognizance of specific agency duties and goals; the development of more synchronized and comprehensive State flood hazard mitigation programs; and the opportunity to educate all who interact to some degree with flood hazards, including the general public, private interests, and disaster relief.

The State Assistance Program should provide the funding for State sponsored workshops and seminars. Training, information and education is imperative to a productive State flood hazard mitigation program. Therefore, emphasis on training, information and education will initiate the foundation necessary for a comprehensive program.

406 Planning

Section 406 of the Disaster Relief Act of 1974, P.L. 93-288 (See Appendix C) requires state and local governments to promote

post-disaster hazard mitigation through actions by state and local governments in areas which have received Federal disaster relief following a major flood disaster. Such hazard mitigation actions will be implemented through three stages of post-disaster analysis of hazard areas: first, the development of damage surveys for public property; second, the creation of hazard mitigation teams to recommend hazard mitigation measures (discussed in more detail in the next section); and finally, the development of a hazard mitigation plan.

This hazard mitigation plan must be prepared 180 days following a presidentially declared disaster. This plan is to serve as a basis for long-range adoption of mitigation actions. The actions which must be considered include:

1. Local actions
    a. local warning and evacuation plans,
    b. local land use and construction control,
    c. potential relocation project areas including funding sources,
    d. potential structural projects along with funding sources, and
    e. non-structural projects along with funding sources.
2. State actions
    a. evaluations of regional warning and evacuation plans,
    b. evaluation of state land use and construction control enabling and/or regulatory legislation,
    c. mitigation measures for the rehabilitation of state-owned damaged property,

d. State participation in flood mitigation projects, and

e. areas needing new or updated flood data bases.

The plan is required to include target dates for completion of the elements of the State and local actions.

The State's flood management program as specified through the FHMA of 1976, can be used to integrate 406 planning efforts into the watershed planning program. The consistency of the goals of the FHMA with 406 hazard mitigation analysis allows attention to the 406 plan requirements through the development of the required watershed plans. Through the studies forming the basis for the plans, the plans will accomplish a substantial amount of post-disaster hazard mitigation planning. When federal disaster relief funds are received for a geographic area, the local watershed plan can be used as a foundation for the 406 plan through the consideration of mitigation resources. Therefore, the local watershed plans should address the requirements of the post-disaster hazard mitigation plan in a pre-disaster context.

Regional Post-Disaster Hazard Mitigation Teams

As a component of post-disaster hazard mitigation planning, Section 406 calls for the creation of regional post-disaster hazard mitigation teams to address hazard mitigation for areas receiving Federal aid. An interagency agreement at the national level was developed in December 1980 by the heads of relevant agencies to support the purpose and intent of the hazard mitigation team concept. These teams, composed of regional representatives from 12 Federal agencies and a state representative, go into an area after a flood

disaster has occurred and make long term recovery recommendations based on mitigating future losses. A discussion of the interagency agreement can be found in Appendix A, Federal Emergency Management Agency.

The state representative is an essential component of the team, providing the only state representation on the team. It is therefore important to ensure that the Maryland representatives for this team are experts in the implementation of the State flood hazard mitigation program. To enhance this expertise, the State should train these individuals in long term recovery practices. This should also be coordinated with the longer term "hazard mitigation plan" required under Section 406 of the Disaster Relief Act of 1974 and 406 attention in the flood management plans of the FHMA, as mentioned in the previous discussion.

The decisions made by the hazard mitigation team can drastically reduce future flood damages if the recommendations are valid and coordinated with the local community structure. With a well-trained State representative on the team, the State can provide a greater opportunity for the long term recovery recommendations to be integrated into the local rehabilitation efforts.

Institution of Flood Warning Systems at the Local Level

A local flood forecasting and warning system can provide advance warning of flooding conditions which may threaten human life and damage property (for a discussion of existing flood warning systems in Maryland, see Appendix A, National

Weather Service, Baltimore County Office of Civil Defense and Howard County Civil Defense Office).

For participating local governments, the national flood forecasting and warning system is operated by the National Weather Service, (a component of National Oceanic and Atmospheric Administration, Department of Commerce). Rainfall reports and river gage readings are assembled by the National Weather Service River District Offices, sent to the Middle Atlantic River Forecast Center at Harrisburg, PA, and then transferred through different National Weather Service offices before reaching flood prone communities.

The local civil defense or emergency preparedness office provides the essential element in this process by transposing flood warning messages into emergency activities at the local level. The capability for coordination and communication is necessary at the local level to provide this transformation of information to action at the community level.

The State should provide support and technical assistance in the development of flood warning systems in areas where appropriate. This would also require the coordination of Federal and local agencies. At the Federal level, the National Weather Service, the Army Corps of Engineers and the Federal Emergency Management Agency have the authority and responsibility to coordinate with State agencies. At the local level, county emergency management agencies or civil defense offices must provide the coordination and the linkages to municipal governments.

Currently, the Water Resources Administration is involved with the initiation of flood warning systems through the

Flood Hazard Management Act of 1976. Flood warning systems are listed in the Act as one of the management techniques for watershed planning. In addition, the Water Resources Administration is working with Maryland Emergency Management and Civil Defense Agency in the establishment of flood warning systems for areas which may be subject to inundation by dam failures. For more information, see Appendix A, Water Resources Administration, Dam Safety Division and Appendix C, the Flood Hazard Management Act of 1976.

Water Resources Administration and Maryland Emergency Management Agency should provide technical assistance to public and private groups for the establishment of flood warning systems at the local level. The State agencies should also continue to work with the National Weather Service and other Federal agencies to promote flood warning systems, where appropriate, to reduce potential flood damages.

## KEY FOR TABLES 1-3

The following is a description of Table 1, Table 2, and Table 3.

Table 1 - Flood Hazard Mitigation Responsibilities of Federal, Regional and Private Agencies in Maryland

This table depicts the flood hazard mitigation responsibilities (previously discussed) of Federal, Regional and Private agencies. Further elaboration on these responsibilities is provided in Appendix A. Each agency is listed and discussed with contacts and publication names provided.

Table 2 - Flood Hazard Mitigation Responsibilities of Maryland State Agencies

This depicts the flood hazard mitigation responsibilities of Maryland State agencies. Discussion on these agencies, their flood hazard mitigation responsibilities, contacts and publications is found in Appendix A.

Table 3 - Levels of Involvement of Maryland State Agencies in Flood Hazard Mitigation Activities

This table is a more detailed description of Table 2. The flood hazard mitigation responsibilities (broken down further to specific activities as previously defined) and levels of involvement (defined following Table 3) are listed for each State Agency. Additional discussion is provided in Appendix A.

Table 1 Flood Hazard Mitigation Responsibilities of Federal, Regional and Private Agencies in Maryland

| Federal Agencies | Disaster Preparedness and Assistance | Flood Damage Reduction (Non-Structural) | Flood Control | Development and Redevelopment Policies | Research | Information and Education |
|---|---|---|---|---|---|---|
| Army Corps of Engineers | X | X | X | X | X | X |
| Coast Guard | X[1] | | | | | |
| Farmers Home Administration | X[1] | | | | | |
| Federal Emergency Management Agency | | | | | | |
| Federal Highway Administration | X[1] | | | X | X | |
| U. S. Geological Survey | | | | | X | X |
| National Weather Service | X | | | | | X |
| Small Business Administration | X[1] | | | | | |
| Soil Conservation Service | X | X | X | X | | X |
| Water Resources Council | | | | X | X | X |

[1]Assistance Only

Table 1 cont. Flood Hazard Mitigation Responsibilities of Federal, Regional and Private Agencies in Maryland

| Other Agencies | Disaster Preparedness and Assistance | Flood Damage Reduction (Non-Structural) | Flood Control | Development and Redevelopment Policies | Research | Information and Education |
|---|---|---|---|---|---|---|
| Local Governments | X | X | X | X | | X |
| Local Civil Defense Offices | X | | | | | |
| Susquehanna River Basin Commission | X | X | X | X | X | X |
| Red Cross | X | | | | | |

Table 2 Flood Hazard Mitigation Responsibilities of Maryland State Agencies

| State Agencies | Disaster Preparedness and Assistance | Flood Damage Reduction (Non-Structural) | Flood Control | Development and Redevelopment Policies | Research | Information and Education |
|---|---|---|---|---|---|---|
| Department of Agriculture | X | | | | | |
| Department of Economic and Community Development | X | | | | | |
| Department of Health and Mental Hygiene | | | | X | | |
| Department of Human Resources | X | | | | | |
| Department of Natural Resources | | | | | | |
| Capital Programs Administration | | X | X | | | |
| Maryland Forest Service | | | X | | | |
| Maryland Geological Survey | | | | | X | X |

Table 2 cont. Flood Hazard Mitigation Responsibilities of Maryland State Agencies

| State Agencies (Continued) | Disaster Preparedness and Assistance | Flood Damage Reduction (Non-Structural) | Flood Control | Development and Redevelopment Policies | Research | Information and Education |
|---|---|---|---|---|---|---|
| Maryland Wildlife Administration (Save Our Streams) | X | X | | X | X | X |
| Tidewater Administration | | | | X | X | X |
| Water Resources Administration | X | X | X | X | X | X |
| Department of State Planning | | | | X | | X |
| Department of Transportation (State Highway Administration) | | | X | X | X | |
| Maryland Emergency Management and Civil Defense Agency | X | | X | X | | X |
| University of Maryland | | | | | X | |

TABLE 3 Levels of Involvement of Maryland State Agencies in Flood Hazard Mitigation Activities

| MARYLAND STATE AGENCIES | DISASTER PREPAREDNESS AND ASSISTANCE | | | NON-STRUCTURAL FLOOD DAMAGE REDUCTION | | | STRUCTURAL FLOOD CONTROL WORK | | | | | DEVELOPMENT AND REDEVELOPMENT POLICIES | | | RESEARCH | INFORMATION AND EDUCATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flood forecasting, warning and evacuation plans | Flood emergency measures | Post-flood recovery | Flood Insurance | Acquisition | Flood-proofing | Dams and reservoirs | Dikes, levees and floodwalls | Channel alterations and diversions | Land treatment stabilization and on-site detention | Flood plain management | Storm water drainage practices | Recreation and open space planning | | |
| DEPARTMENT OF AGRICULTURE | | | i,fs, ppd | | bp | | | | | | | | | | |
| DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT | | | i, ppd | | | | | | | | | | | | |
| DEPARTMENT OF HEALTH AND MENTAL HYGIENE | | | | | | | | | | | rc,i, ra, bp | rc,ta i,ra, ppd | | | |
| DEPARTMENT OF HUMAN RESOURCES | | | i, ppd | | | | | | | | | | | | |
| DEPARTMENT OF NATURAL RESOURCES | ta | ta | ta | rc, ta, ppd | ta, fs,ra ppd | ta, ra, ppd | rc,ta fs,ra ppd | rc,ta fs,ra ppd | rc,ta fs,ra ppd | rc,ta fs,ra ppd | rc,ta fs,i ra ppd | rc,ta ra, ppd | rc,ta fs,i ra, ppd | rc,ta fs,i | ta,fs i,ppd |
| DEPARTMENT OF STATE PLANNING | rc | rc | rc | | i | | rc | rc | rc | rc | rc,ta ppd | rc, ppd | rc,ta i,ra, ppd | rc | rc |
| DEPARTMENT OF TRANSPORTATION (STATE HIGHWAY ADMINISTRATION) | fs,i ppd | i, ppd | fs,i ppd | ta | fs,i ppd | fs,i ppd | fs,i ppd | ta | fs,i ppd | ta,fs i, ppd | fs,i ppd | i | fs,i, ppd | | |
| MARYLAND EMERGENCY MANAGEMENT AND CIVIL DEFENSE AGENCY | i, ppd | fs,i ppd | ra,i ppd | | | | | | | | | | | | fs,i ppd |
| UNIVERSITY OF MARYLAND | | | | | | | | | | | | | | i | i |

KEY

rc - Review and Comment

ta - Technical Assistance

fs - Funding Source

i - Implementation

ra - Regulatory Authority

bp - By-Product of Normal Activities

ppd - Planning and Program Development

## LEVELS OF INVOLVEMENT

### Review and Comment

Review and comment is the level at which an agency is obligated to review plans and projects to determine consistency with on-going plans, programs and policies of the agency. After review, comments are submitted to the lead agency for the plan or project.

### Technical Assistance

Qualified staff members provide technical assistance to communities, other state agencies and private individuals and businessess. Such assistance may include map interpretation, technical advice and training, pre-and post-flood hazard mitigation planning, flood insurance, and case-by-case project review.

### Funding Source

A funding source is an agency which provides the funding for such flood hazard mitigation activities as staff, mapping, technical assistance, research, studies, public education, monitoring and enforcement, and supplementary measures.

### Implementation

Implementation is the process by which a project, regulation or program is accomplished or put into effect.

### Regulatory Authority

The regulatory authority is the agency with the statutory authority either to directly regulate hazard mitigation activities or to ensure local adoption and administration of regulations.

By-Product of Normal Activities

When the programs and projects of an agency interact with or are affected by flood hazard mitigation goals, flood hazard mitigation can be considered a by-product of normal activities. For example, the development of a park along a river is a project that incorporates flood hazard mitigation as a by-product.

Planning and Program Development

Planning and program development includes the orgination and preliminary planning studies for projects incorporating flood hazard mitigation. This is done with coordination and cooperation of communities, federal agencies and state flood management related personnel.

# APPENDIX A

TABLE OF CONTENTS

APPENDIX A - FLOOD HAZARD MITIGATION AGENCIES

Agency: U. S. Army Corps of Engineers

Flood Hazard Mitigation Responsibility:

Disaster Preparedness and Assistance

Flood Damage Reduction (non-structural)

Flood Control

Development and Redevelopment Policies

Research

Information and Education

Discussion:

The United States Army Corps of Engineers has the Congressional authority to support the nationwide policy established by the Flood Control Act of 1936 that flood control on navigable waters or their tributaries is in the interest of the general public welfare and is therefore a proper activity of the Federal Government in cooperation with the states and local entities. The Act provided that the Federal government may improve streams or participate in improvements "for flood control purposes if the benefits to whomsoever they may accrue are in excess of the estimated costs and if the lives and social security of people are otherwise adversely affected." The Corps may undertake investigations of water and related land resources either under specific authorization by Congress, or under special and continuing authorities.

Within Maryland, the most recently completed Congressionally authorized study was the Baltimore Metropolitan Streams, Maryland, Plan of Study. This study was authorized by resolutions adopted

February 13, 1973, and April 11, 1974, by the Committees on Public Works of the United States Senate and the House of Representatives, respectively. The purpose of the study was to determine the feasibility of providing flood protection along streams in the Baltimore Metropolitan Area. The study included the following streams: Beaverdam Run, Brien Run, and Stemmers Run in Baltimore County; Gwynns Falls and Jones Falls in Baltimore City and County; Herring Run and Maiden's Choice Run in Baltimore City; and the Patapsco River in Anne Arundel, Baltimore, and Howard Counties.

Various structural and non-structural alternatives were investigated as solutions to the flood problems. None of the alternative plans or management measures studied were found to be feasible as Federal projects; therefore, at the finish of the study, the District Engineer recommended that no further action be taken by the Corps of Engineers to provide protection along streams in the Baltimore Metropolitan Area. The report which resulted from this study, entitled Review Report, Baltimore Metropolitan Streams, Maryland, was completed in August 1979.

A description of the Corps' special and continuing authorities which relate to flood control and flood hazard reduction is provided below. Each of these authorities is aimed at controlling damage and/or relieving human and financial loss.

Section 205, Small Flood Control Projects

Section 205 of the 1948 Flood Control Act, as amended, provides authority for the Chief of Engineers to develop and construct small flood control projects that have not been already specifically authorized by Congress. Demonstration of engineering feasibility

and economic justification is necessary before the project can be adopted for construction under Section 205. Each project must be economically justified and limited to a Federal cost of not more than $2,000,000 or $3,000,000 in areas that have been designated disaster areas within the past five years. The cost of the project must include all related costs for construction, investigations, inspection, engineering, preparation of plans and specifications, supervision and administration.

A Section 205 project alleviates major flood problems by means of reservoirs, local protection works, or by combinations of both. The usual 205 project may consist of a channel enlargement, realignment, removing obstructions, constructing levees and floodwalls, providing channel paving, and stabilizing banks with stone and concrete, or by combinations of these methods. Non-structural alternatives are also considered. These generally involve altering the flood susceptibility of individual structures and include raising, flood-proofing, acquisition and demolition, relocation, and addition of a raised or floodproofed "utility cell." Maintenance and operation of the flood control facilities constructed under Section 205 authority are a non-Federal responsibility. Utility relocations and alterations of buildings, utilities, highways and highway bridges, and special facilities are entirely a local responsibility and are accomplished at non-Federal expense. Local interests also provide all lands, easements, and right-of-way necessary for the construction of the project.

A municipality or public agency fully authorized under state laws must submit formal assurances of local cooperation. As a

project is dependent upon local cooperation and participation, the importance of the existence of a legally authorized and financially capable local sponsoring agency warrants special attention. The sponsoring agency must normally agree to:

1. Provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project.
2. Provide without cost to the United States all necessary relocations and alterations of buildings and utilities, highways and highway bridges, sewers, related and special facilities.
3. Hold and save the United States free from damages due to the construction and subsequent maintenance of the project, except damages due to the fault or negligence of the United States or its contractors, and, if applicable, adjust all claims concerning water rights.
4. Maintain and operate the project works after completion without cost to the United States in accordance with regulations prescribed by the Secretary of the Army.
5. Prevent further encroachment which might interfere with proper functioning of the project for flood control.
6. Assume responsibility for all costs in excess of the Federal cost limitation of $2,000,000 (or $3,000,000 whichever is appropriate).

7. Provide guidance and leadership in preventing unwise future development of the flood plain by use of appropriate flood plain management techniques to reduce flood losses.

In addition, local assistance can be provided by local proponents of small flood control projects through the collection and furnishing of data needed to formulate the project plan and to evaulate project benefits.

Examples of information that local groups can obtain are:

1. Estimates of damage from each of the past major floods.
2. Any accurate local surveys which can be used to indicate flood elevations and areas flooded.

An example of a Section 205 project is one completed in 1964 for the Western and Collington Branches of the Patuxent River in Upper Marlboro, Prince George's County. The project consists of levee, floodwall, floodway clearing, and channel improvements. In addition, an extra span was added to a highway bridge and a combined railroad and highway bridge was constructed.

Flood Plain Management Services Program

Section 206 of the Flood Control Act of 1960, as amended, provides authority for the Flood Plain Management Services Programs (FPMS). This program provides technical expertise in flood plain management matters in aiding states, counties, cities, and other Federal agencies to deal with floods and flood plain related matters. This expertise will also be provided to individuals when the requested information is readily available. This assistance

is given within the limits of available appropriations which have averaged around $9 million annually over the past five years.

The objective of the FPMS Program is to support comprehensive flood plain management planning with technical services and planning guidance at all appropriate governmental levels; and thereby, to encourage and to guide them toward prudent use of the Nation's flood plains for the benefit of the national economy and welfare. For other Federal agencies, this is especially important because they must meet the requirements of Executive Order 11988, titled "Flood Plain Management." Adjustment of land use based on proper planning and by employment of a variety of techniques for reducing flood damages and damage potential, constitutes a rational means by which the locational advantages and natural resource values of flood plains can be balanced with the inevitable hazards which floods pose.

Upon request, the FPMS Program provides a full range of technical services and planning guidance on floods and flood plain issues within the broad umbrella of flood plain management. With minor exceptions, services are non-reimbursable. However, involvement of requesters is encouraged. They may furnish field survey data, maps, historical flood information and the like. Such participation by requesters can help by reducing costs to the general public, in setting work priorities, and in assuring continued community interest. Activities under the Corps FPMS Program are described below.

Flood and flood plain related data are obtained or developed and interpreted. Topics include: flood formation and timing, flood

depth or stage, flood water velocity, extent of flooding, duration of flooding, flood frequency, obstruction of flood flows, "regulatory floodway," natural and cultural resource values of note, and flood loss potentials before and after employment of flood plain management measures.

Planning assistance and guidance is provided for implementing or meeting requirements of: flood plain regulations; flood warning and flood emergency preparedness; floodproofing measures (e.g., elevation, closures and seals, and anchorage); permanent evacuation and relocation; the National Flood Insurance Program; and Executive Order 11988. The Corps assists in all aspects of flood plain management planning. This can range from helping a community identity the future of the flood plain and related problems (present or future), to a broad assessment of remedial measures (both of the flood modifying and occupance modifying varieties) that may be appropriate. Included are the possible impacts of off-flood plain land use changes on the physical, socio-economic and environmental conditions of the flood plain.

The Program includes studies to improve methods and procedures for flood damage prevention and abatement, and preparation of guides and pamphlets on topics such as floodproofing, flood plain regulations, flood plain occupance, economics of flood plain regulations, and important natural flood plain values. Guides and pamphlets are prepared for use by states and local governments, by private citizens, and by Federal agencies in planning and in taking action to reduce flood damages or damage potentials as part of a flood plain management program.

The Baltimore District is currently conducting a technical assistance study within the State of Maryland under its Flood Plain Management Services Program. At the request of the City of Baltimore, the District is conducting floodproofing surveys of nonresidential structures within the Jones Falls Valley in an attempt to reduce future flood damages. Priorities with regard to structures to be surveyed were set by the City and a Corps survey team was established. A total of 13 industries will be surveyed and recommendations of measures to reduce floods will be submitted to each industry for its consideration and possible implementation.

Protection of Essential Highways, Highway Bridge Approaches, and Public Works

Section 14 of the 1946 Flood Control Act, as amended, grants the Corps the authority to provide bank protection of highways, highway bridges, and essential public works endangered by flood caused erosion. The Corps designs and constructs the project. Each project selected must be feasible from an engineering standpoint, complete within itself, and economically justified. Non-Federal interests are responsible for all project costs in excess of the Federal limit of $250,000. Non-Federal sponsors must provide lands, easements, rights-of-way, utility relocations, hold and save the United States free from damages, and maintain the completed project at local cost. States, political subdivisions of states, and other responsible local agencies are eligible to apply for this bank protection work.

Snagging and Clearing for Flood Control

The Corps is provided the authority under Section 208 of the 1954 Flood Control Act, as amended, to reduce flood damages through

removal of accumulated snags and other debris, and for the clearing and straightening of stream channels. As with certain other programs, the Corps designs and constructs the project. Each project selected must be feasible from an engineering standpoint, complete within itself, and economically justified. The non-Federal sponsor must provide all lands, easements, and rights-of-way; provide all project costs in excess of the Federal limit of $250,000; agree to maintain the project after construction; hold and save the United States free from damages; provide a contribution toward construction costs for land enhancement or special benefits; agree to prevent future encroachment or which might interfere with proper functioning of the project for flood control. Local cost participation requirements and procedures for determining the local share of project cost are similar to those for flood control projects specifically authorized by Congress under regular authorization procedures. States, political subdivisions of states, or other responsible local agencies are eligible to apply for assistance in the clearing of waterways.

Flood Fighting and Rescue Operations and Emergency Protection of Coastal Protective Works Federally Authorized

The Flood Control Act of 1941, as amended, gives the Corps authority to provide emergency assistance, as required, to supplement local efforts and capabilities in time of flood or coastal storm. Assistance in all phases of flood fighting and rescue operations is provided. State and local governments must, however, use their own resources to the maximum extent feasible usually including the furnishing of common labor.

Flood Control Works and Federally Authorized Coastal Protection Works, Rehabilitation

Under the Flood Control Act of 1941, as amended, the Corps can assist in the repair and restoration of flood control works damaged by flooding or Federally authorized hurricane flood and shore protection works damaged by extraordinary wind, wave, or water action. Authorized assistance includes emergency repair or rehabilitation of flood control works damaged by flooding, and restoration of Federally authorized coastal protection structures damaged by extraordinary wind, wave, or water action. Assistance does not extend to major improvements of flood control or Federally authorized coastal protection structures, nor to reimbursement of individuals or communities for funds expended in repair or rehabilitation efforts. Local interests are normally required to provide without cost to the United States all lands, easements, and rights-of-way necessary for the authorized work; hold and save the United States free from damages due to the authorized work; and maintain and operate, in a manner satisfactory to the Chief of Engineers, all the protective works after completion of repairs. Additionally, work constituting deferred regular maintenance and desired major modifications, may be included at local cost. Owners of damaged protective works, or state and local officials or public entities responsible for their maintenance, repair, and operation are eligible for this type of assistance.

Planning Assistance to States

The Corps is authorized under Section 22 of the Water Resources Development Act of 1974, to cooperate with any state in preparing

comprehensive plans for the development, utilization, and conservation of water and related resources. This includes studies relating to flood control and flood damage reduction. Known as the Section 22 Planning Assistance to States Program, annual funding is limited to $200,000 per state. States determine priorities with regard to what will be studied. Corps input is on an effort or service sharing basis in lieu of an outright grant.

FOR MORE INFORMATION:

Contact:

District Engineer
U. S. Army Engineer District, Baltimore
P. O. Box 1715
Baltimore, Maryland 21203
(301) 962-2549

Publications:

Review Report, Baltimore Metropolitan Streams, Maryland. Baltimore District, Corps of Engineers, Department of the Army, August, 1979.

Major Steps in Corps of Engineers Water Resources Development. Department of the Army, Office of the Chief of Engineers, Washington, DC, July, 1974.

Guidelines for Reducing Flood Damages. U. S. Army Corps of Engineers, Vicksburg, Mississippi, May, 1967.

Baltimore Metropolitan Streams, Maryland, Plan of Study. Baltimore District, Corps of Engineers, Department of the Army, March, 1977.

Directory of Flood and Flood Plain Related Financial and Technical Assistance Programs. Baltimore District, Corps of Engineers, October, 1981.

Agency: U. S. Coast Guard

Flood Hazard Mitigation Responsibility:

Disaster Assistance

Flood Emergency Measures

Discussion:

The U. S. Coast Guard enforces or assists in the enforcement of all applicable Federal laws on the navigable waters of the United States. It administers laws and regulations for the promotion of life and property in matters not specifically delegated to the State or some other government agency. It develops, establishes, maintains and operates aids to navigation, ice-breaking operations and rescue efforts for the promotion of safety upon U. S. Waters.

In flooding situations the Coast Guard can assist communities through ice-breaking efforts to reduce flood levels produced by ice blockages. It can assist in search and rescue operations and be utilized in evacuation efforts. It can place emergency regulations upon navigational uses of flooded rivers to reduce possible flood damages. The Coast Guard works closely with other Federal, State and local agencies in all search and rescue situations.

FOR MORE INFORMATION:

Contact:

Coast Guard Group Baltimore
Building 70
Coast Guard Yard
Baltimore, Maryland 21226
(301) 789-1600, ext.418 (available 24 hours a day)
Coast Guard Stations located throughout the Chesapeake Bay area.

Agency: Farmers Home Administration

Flood Hazard Mitigation Responsibility:

Disaster Assistance

Post-Flood Recovery

Discussion:

The Farmer's Home Administration (FmHA) provides farm emergency loans to eligible farmers to cover losses from natural disasters that are not otherwise compensated by other disaster relief programs.

Originally this program was for farmers not otherwise eligible for aid, however under the Small Business Development Act of 1980, FmHA was given authority to make unsubsidized emergency loans to farmers who are able to get credit from commercial lenders. The law limits loans to credit-worthy borrowers for actual loss only.

To qualify for a farm emergency loan an applicant must:

1. Be an established farm operator, (owner or tenant) who was operating and managing a farm at the time of the disaster in an area which was designated for emergency loans. An applicant can be farming as an individual, cooperative corporation or partnership.
2. Be a citizen of the United States or have more than 50 percent U. S. citizen interest if the farm ownership is more than one person.
3. Be able to repay the loan.
4. Have suffered a qualifying production and/or physical loss.

5. To qualify for subsidized loss loans and annual production and/or major adjustment loans, a farm operator must be unable to get sufficient credit elsewhere. An applicant who is able to get credit elsewhere may receive a loan for actual losses only, provided they are otherwise eligible.

FOR MORE INFORMATION:

Contact:

Farmers Home Administration
U. S. Department of Agriculture
Robscott Building
151 East Chestnut Hill Road, Suite 2
Newark, Delaware 19713
(302) 573-6694

Agency: Federal Emergency Management Agency

Flood Hazard Mitigation Responsibility:

Disaster Preparedness and Assistance

Flood Damage Reduction (non-structural)

Development and Redevelopment Policies

Research

Information and Education

Discussion:

The Federal Emergency Management Agency (FEMA) is the executive agency that serves as a single point of contact with the Federal government for all emergency management activities.

Among FEMA's flood hazard mitigation activities are:

1. Assistance to State and local governments with emergency preparedness planning.
2. Practical application of research to lessen the effects of emergencies and disasters.
3. Coordination of activities to promote dam safety.
4. Development of community awareness programs for weather emergencies.
5. Provision of scientific information and technical assistance programs to State and local governments to reduce or eliminate flood risks for new and existing structures.
6. Administration of programs to assist individuals and businesses to obtain insurance protection against floods, crime and riots.

Relating to Maryland's flood hazard mitigation program: the National Flood Insurance Program, technical assistance to local governments, the State Assistance Program and the Inter-agency Agreement for Post Disaster Recovery and Planning are elaborated further in this discussion.

The National Flood Insurance Program makes flood insurance available to property owners at subsidized rates, in return for which communities are required to carry out flood plain management measures to protect lives and reduce property losses.

There are two phases in this program. The first phase, the Emergency Program, was created to enable residents of flood hazard areas to acquire insurance before a technical study is conducted to determine risk premium (actuarial) rates for the community which identify the extent of flood hazard areas. Communities must then adopt minimum flood plain management regulations and a limited amount of coverage is available.

The second phase, the Regular Program, becomes effective when FEMA completes the final study for a community which includes a flood insurance rate map for determining actuarial rates and final determinations on flood elevations within the community. In this phase of the program, the community must adopt and enforce flood plain land use rules and regulations in order to remain eligible for flood insurance. Coordination with local governments is achieved by liaison at the State level with the designated State agency in Maryland, Water Resources Administration.

Technical assistance is provided to communities in both flood plain and post disaster hazard mitigation activities, such as the relocation of structures from flood prone areas. Funding is provided to States on a contractual basis for these flood plain management functions. Technical assistance and funding is also provided to communities through Section 1362 of Public Law 90-448, as amended. Through Section 1362 the Director of FEMA is given the authority to negotiate for the purchase and subsequent transfer to a State or local government of damaged (usually by flood), improved real property under certain conditions. Acquisition of flood damaged real property reduces flood losses to properties built prior to the adoption of adequate flood plain management measures, reduces future federal costs for disaster relief and flood insurance subsidies; and offers flood victims the opportunity to break the cycle of damage and costly recovery from flooding.

The State Assistance Program was designed to promote an intergovernmental flood hazard mitigation partnership by providing States with the opportunity to strengthen their role in NFIP flood hazard mitigation activities. This is achieved by providing States funding through annual grants. For Maryland the first year of the project, 1981, involved two tasks: first, the preparation of this master plan for flood hazard mitigation activities in Maryland; and second, training for State flood management staff. The second year, 1982, also involves two tasks: first, the development of public information techniques for individuals and groups who deal with the National Flood Insurance Program and related State activities; and second, the establishment of flood

FOR MORE INFORMATION:

Contact:

Region III
Walter Pierson
Federal Emergency Management Agency
6th and Walnut Streets
Philadelphia, PA 19106
(215) 597-9416

National Headquarters
Federal Emergency Management Agency
500 C. Street S.W.
Washington, DC 20472
(202) 634-1600

Federal Emergency Management Agency
Flood Related Publications

Federal Insurance Administration
Office of Natural and Technological
Hazards Program

Manual for the Construction of Residential Basements in Non-Coastal Flood Environs

Elevated Residential Structures Update

Alternatives for Implementing Substantial Improvements Definitions

Flood Emergency and Residential Repair Handbook

Flood Plain Management Guidelines - Executive Order 11988

Elevating to the Wave Crest Level; A Benefit: Cost Analysis

Economic Feasibility of Floodproofing-Analysis of a Small Commercial Building

Proceedings of the National Conference on Coastal Erosion

Flood Plain-Handle with Care

Introduction to Floodproofing

A Perspective on Flood Plain Regulations for Flood Plain Management

Floodproofing Regulations

Statutory Land Use Control Enabling Authority in the Fifty States

Flood-prone Areas and Land Use Planning

A Unified National Program for Flood Plain Management

Coastal Environmental Management: Guidelines for Conservation of Resources and Protection against Storm Hazards

Seismic Safety and Land Use Planning

How to Read a Flood Hazard Boundary Map

How to Read a Flood Insurance Rate Map

Design and Construction Manual for Residential Buildings in Costal High Hazard Areas

Design for Flood Hazard Reduction: Design Guidelines for Architects

Evaluation of Alternative Means of Implementing Section 1362 of the National Flood Insurance Act of 1968

Evaluation of the Economic, Social and Environmental Effects of Flood Plain Regulations

Flood Hazard Mitigation Handbook of Procedures for the Interagency Regional Hazard Mitigation Teams

Local Citizen's Guide to the National Flood Insurance Program

THESE PUBLICATIONS ARE AVAILABLE THROUGH FEMA

Agency: Federal Highway Administration

Flood Hazard Mitigation Responsibility:

Disaster Assistance

Development and Redevelopment Policies

Flood Plain Management

Storm Water Drainage

Research

Discussion:

The Federal Highway Administration (FHWA) operates under specific rules and regulations for review and design of highway projects encroaching on flood plains. According to the Department of Transportation's final rule published in the Federal Register on November 26, 1979, FHWA's present policy is:

1. to encourage a broad and unified effort to prevent uneconomic, hazardous or incompatible use and development of the Nation's flood plains:
2. to avoid longitudinal encroachments, where practicable;
3. to avoid significant encroachments, where practicable;
4. to minimize impacts of highway agency actions which adversely affect base flood plains;
5. to restore and preserve the natural and beneficial flood plain values that are adversely impacted by highway agency actions;
6. to avoid support of incompatible flood plain development;
7. to be consistent with the intent of the Standards and Criteria of the National Flood Insurance Program, where appropriate and;

8. to incorporate "A Unified National Program for Flood Plain Management" of the Water Resources Council into FHWA procedures.

This is accomplished through regulations and resultant location and design criteria for FHWA projects and highway projects receiving Federal funds.

FHWA services primarily as a funding source for highway projects, therefore, their main flood hazard mitigation responsibility lies in the review of projects receiving Federal-aid highway funds.[1]

FOR MORE INFORMATION:

Contact:

Stanley Davis
Hydraulics Engineer

Philip Thompson
Hydraulics Engineer

U. S. Department of Transportation
Federal Highway Administration
Washington, D.C. 20590
(202) 472-7690

Publications:

"The Design of Encroachments on Flood Plains Using Risk Analysis-Hydraulic Engineering Circular No. 17", Hydraulics Branch, Bridge Division, Office of Engineering, Federal Highway Administration, April, 1981.

"Location and Hydraulic Design of Encroachments on Flood Plains: Final Rule" (23 CFR 650, Regulation implementing EO 11988), Federal Register, Volume 44, No. 228, November 26, 1979, page 67578 through 67582.

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[1] FHWA supports a cost-effective approach to the selection of design alternatives with consideration given to capital costs and risks and to other economic, engineering, social and environmental concerns.

Federal-Aid Highway Program Manual, Volume 6, Engineering and Traffic Operations: Chapter 7, Bridges, Structures and Hydraulics, Section 3, Hydraulics, Erosion Control and Water Quality; Subsection 2, Location and Hydraulic Design of Encroachments on Flood Plains, Federal Highway Administration, November 15, 1979.

Agency: U. S. Geological Survey

Flood Hazard Mitigation Responsibility:

Research

Information and Education

Discussion:

The U. S. Geological Survey (USGS), through its Water Resources Division, investigates the occurrence, quantity, distribution and movement of the surface and underground water through all the states. This agency serves as the principal Federal water data agency, collecting and disseminating about 70 percent of the water data currently being used by State, local, private and other Federal agencies. This program consists of the collection of basic hydrologic data, aerial resource appraisal and interpretive studies, research projects, and the analysis and dissemination of the data and results of its investigations. Much of the work is a cooperative effort in which planning and financial support are shared by State and local governments and other Federal agencies.

Hydrologic-data Stations are maintained by the Geological Survey at selected locations throughout Maryland for obtaining records on stream discharge or stage, reservoir and lake storage, ground-water levels, and the quality of surface and ground water. Every year stations are added and others are terminated; thus the Water Resources Division has both a current and historical file of hydrologic data. All data collected is stored in the Geological Survey's National Water Data Storage and Retrieval System (WATSTORE) and is available on request to water planners and other involved

in making decisions affecting the State's water resources. This data can be retrieved in machine-readable form or in the form of computer-printed tables or graphs, statistical analyses and digital plots. Local assistance in the acquisition of services or products from WATSTORE can be obtained from the District Chief, Water Resources Division in Towson, Maryland. (A list of gauging stations in Maryland follows this discussion).

Surface-water discharge (streamflow) and stage (water level) data are collected for general hydrologic purposes such as assessment of water resources, aerial analysis, determination of long-term trends, research and special studies, or for management and operational purposes. In Maryland and the District of Columbia, discharge and stage data currently are being obtained at stations identified at the end of this dicussion.

Records of streamflow have been published for many years as Geological Survey water-supply papers. Beginning with the 1975 water year, however, this series was replaced by a new publication series, U. S. Geological Survey Water Data Reports. These reports contain streamflow and groundwater data. Information on these reports may be obtained from the District Chief, Water Resources Division, Towson, Maryland.

Techniques for estimating the magnitude and frequency of floods on natural streams having no urban development or regulated flow in Maryland and the District of Columbia are given in the Water Resources Investigations Open-File Report 8-1016, "Technique for Estimating Magnitude and Frequency of Floods in Maryland."

Topographic maps outlining flood prone areas (the 100-year flood plain) have been prepared by the Geological Survey for all of Maryland and the District of Columbia except those areas which are tide affected. Several urban areas with flood problems have been extracted from the topographic maps and have been published as pamphlets. Information on these may be obtained from the District Chief, Water Resources Division.

FOR MORE INFORMATION:

Contact:

Herbert J. Frieberger,
District Chief
U. S. Geological Survey
Water Resources Division
208 Carroll Building
8600 LaSalle Road
Towson, Maryland 21204
(301) 828-1535

Publications:

Water Resources Investigation in Maryland and the District of Columbia, Department of the Interior, U. S. Geological Survey, Washington, DC.

U. S. Geological Survey Water Data Reports, Department of the Interior, U. S. Geological Survey, Washington, DC.

GAUGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH USGS RECORDS ARE PUBLISHED

NORTH ATLANTIC SLOPE BASINS

POCOMOKE RIVER BASIN
Pocomoke River near Willards, MD
    Nassawango Creek, near Snow Hill, MD

MANOKIN RIVER BASIN
Manokin Branch (head of Manokin River) near Princess Anne, MD

NANTICOKE RIVER BASIN
    Faulkner Branch at Federalsburg, MD

TRANSQUAKING RIVER BASIN
Transquaking River:
    Chicamacomico River near Salem, MD

CHOPTANK RIVER BASIN
Choptank River, near Greensboro, MD
    King's Creek:
    Beaverdam Branch at Matthews, MD

CHESTER RIVER BASIN
Chester River:
    Unicorn Branch, near Millington, MD
    Morgan Creek, near Kennedyville, MD

ELK RIVER BASIN
Big Elk Creek (head of Elk River) at Elk Mills, MD
Long Creek, near Chesapeake City, MD

NORTHEAST RIVER BASIN
Northeast Creek (head of Northeast River) at Leslie, MD

PRINCIPIO CREEK BASIN
Principio Creek, near Principio Furnace, MD

SUSQUEHANNA RIVER BASIN
Susquehanna River at Conowingo, MD
    Deer Creek at Rocks, MD

BUSH RIVER BASIN
Winters Run, near Benson, MD

GUNPOWDER RIVER BASIN
Gunpowder Falls (head of Gunpowder River)
    Little Falls at Blue Mount, MD

Western Run:
    Delaware Run:
        Slade Run, near Glyndon, MD
Western Run at Western Run, MD
Long Green Creek at Glen Arm, MD
Whitemarsh Run (head of Bird River) at White Marsh, MD

BACK RIVER BASIN
Herring Run (head of Back River):
    West Branch Herring Run at Idlewyle, MD
    Stemmers Run (head of Northeast Creek) at Rossville, MD
    Brien Run at Stemmers Run,MD

PATAPSCO RIVER BASIN
East Branch of North Branch Patapsco River:
    West Branch of North Branch Patapsco River:
    Cranberry Branch, near Westminster, MD

North Branch Patapsco River at Cedarhurst, MD
Patapsco River at Hollofield, MD
    West Branch Herbert Run:
    East Branch Herbert Run at Arbutus, MD
Gwynns Falls at Villa Nova, MD
    Dead Run at Franklintown, MD
Jones Falls at Sorrento, MD

SOUTH RIVER BASIN
North River (head of South River):
    Bacon Ridge Branch at Chesterfield, MD

PATUXENT RIVER BASIN
Patuxent River, near Unity, MD
    Cattail Creek, near Cookesville, MD
    Cattail Creek at Roxbury Mills Road at Roxbury Mills, MD
    Hawlings River,near Sandy Spring, MD
Patuxent River, near Laurel, MD
    Little Patuxent River at Guilford, MD
Patuxent River near Bowie, MD

POTOMAC RIVER BASIN
North Branch Potomac River at Steyer, MD
North Branch Potomac River at Kitzmiller, MD
North Branch Potomac River at Barnum, WV
    Savage River, near Barton, MD

Crabtree Creek, near Swanton, MD
Savage River below Savage River Dam, near Bloomington, MD
North Branch Potomac River at Luke, MD
Georges Creek at Franklin, MD
North Branch Potomac River near Cumberland, MD
Town Creek, near Oldtown, MD
Potomac River at Paw Paw, WV
Potomac River at Hancock, MD
Conococheague Creek at Fairview, MD
Marsh Run at Grimes, MD
Potomac River at Shepardstown, WV
Antietam Creek, near Waynesboro, PA
Antietam Creek, near Sharpsburg, MD
Catoctin Creek, near Middletown, MD
Potomac River at Point of Rocks, MD
Monocacy River at Bridgeport, MD
Big Pipe Creek (head of Double Pipe Creek) at Bruceville,MD
Owens Creek at Lantz, MD
Hunting Creek at Jimtown, MD
Fishing Creek, near Lewistown, MD
Linganore Creek, near Frederick, MD
Monocacy River at Jug Bridge, near Frederick, MD
Bennett Creek at Park Mills, MD
Seneca Creek at Dawsonville, MD
Watts Branch at Rockville, MD
Potomac River, near Washington, DC
Rock Creek at Sherrill Drive, Washington, DC
Northeast Branch Anacostia River (head of Anacostia River) at Riverdale, MD
Northwest Branch Anacostia River, near Colesville, MD
Northwest Branch Anacostia River, near Hyattsville, MD
Piscataway Creek at Piscataway, MD
St. Clement Creek (head of St. Clement Bay), near Clements, MD
St. Mary's River at Great Mills, MD

OHIO RIVER BASIN
MONONGAHELA RIVER BASIN
Monongahela River:
Youghiogheny River, near Oakland, MD
Deep Creek Reservoir, near Oakland, MD
Youghiogheny River, near Friendsville, MD
Bear Creek at Friendsville, MD
South Branch Casselman River, near Bittinger, MD
Casselman River at Grantsville, MD

Agency: National Weather Service

Flood Hazard Mitigation Responsibility:

Disaster Preparedness

Flood Forecasting and Warning Systems

Discussion:

Flood forecasting and flash flood warning systems are conducted at various levels and departments within the National Weather Service, (NWS) a part of the National Oceanic and Atmospheric Administration (NOAA).

Different levels of NWS provide the services necessary to conduct flood forecasting. During a flood, Hydrologic Service Areas integrate river and rainfall information from other branches of the Weather Service and issue official river stage forecasts to local Weather Service offices. This hydrologic information is provided for Maryland at the Camp Springs office. This office operates the flood warning system which consists of a network of manual and automatic rainfall observation stations in Maryland, Virginia, West Virginia and adjacent portions of Pennsylvania. Data is collected from these stations and is transferred to the River Forecast Center in Harrisburg, Pennsylvania. This forecast center develops the river staging projections for the Susquehanna, Delaware, Potomac River and James River Basins.

All flash flood warning decisions are made out of the Camp Springs office. Information used includes meteorological data, hydrological data, soil characteristics, soil saturation levels and river basin characteristics. The Hydrologic Service Area

office issues flood warnings when station iformation is combined with already known flood problem areas and vulnerable flash flood levels. Important weather information is distributed to the public through public oriented weather/flood warnings, weather forecasts, as well as press releases to the mass media through the NOAA Weather Wire Services' teletypewriter system and local radio stations.

In addition, the National Weather Service performs many services before and after flooding situations. Before a flood, NWS has assisted local governments in the establishment of flood warning systems. Howard County, Baltimore County and Baltimore City Civil Defense have set up flood warning systems with the aid of NWS.

The NWS also provides information on flood history and current hydrologic trends for use in flood plain management. Daily atmospheric and hydrologic information is compiled for daily and semiweekly forecasts during non-emergency situations. Research and development of techniques is conducted to improve atmospheric and hydrologic measurement and prediction.

After a flood, programs are evaluated for their effectiveness and improvements are recommended to the Weather Service System.

FOR MORE INFORMATION:

Contact:

Leo Harrison
Hydrologist
National Weather Service
World Weather Building, Rm. 302
Washington, D.C. 20233
(301) 763-8271

Fred Davis
Meteorologist In Charge
National Weather Service
Baltimore-Washington International
Airport, Maryland 21240
(301) 962-2177

Agency: Small Business Administration

Flood Hazard Mitigation Responsibility:

Disaster Assistance

Post Flood Recovery

Discussion:

The Small Business Administration (SBA) has the responsibility for the Physical Disaster Loan Program.

The Administrator of SBA may declare an area to be a disaster area as the result of storms, floods, and other catastrophies. The President may also declare the disaster site a "major disaster area." Once an area is declared a disaster area, either on a State or Presidential level, the residents of the area are eligible for a low interest SBA loan. The purpose of these loans is to restore a victim's home or homes (including a mobile home used as a residence of the applicant) or business property, as nearly as possible, to predisaster condition. This includes furniture and other eligible household effects or personal property in a residence, an inventory, including furniture, fixtures, machinery, equipment, and leasehold improvements in a business structure. SBA disaster loans may not be used to replace extraordinarily expensive or irreplaceable items such as antiques, coin and stamp collections, rare paintings, book collections, extensive wardrobes, etc.

Most home or property owners, residential tenants, farmers, businesses of any size, religious, charitable, or nonprofit organizations are eligible for SBA disaster loan assistance to repair or replace physically damaged or destroyed property. All SBA loans to

restore or replace real or personal property which is, or will be, located within a special flood hazard area must be covered by Federal Flood Insurance before any loan funds can be disbursed. If the community where the property is located is not participating in the National Flood Insurance Program, such loans will not be approved where greater than one year has elapsed since that community was formally notified of the identification of a special flood hazard area within its boundaries.

Only those persons who sustained the loss, or those who owned the damaged or destroyed property at the time of the disaster are eligible for financial assistance.

Whenever a disaster victim cannot obtain a building permit to rebuild at the original site, or is unable to restore his or her property at the disaster site for other reasons, the cost of relocation might be included in the loan proceeds. Whenever a disaster victim decides to, but isn't forced to relocate after a disaster, SBA loan funds may not exceed the damage caused by the disaster. Any loan for which the proceeds are used to create a first lien upon a one-to-four family residence to be purchased or constructed at a new site is subject to provisions of the Real Estate Settlement Procedures Act of 1974, as amended.

SBA can only restore property to its "pre-disaster" condition. Therefore, upgrading (building a larger building) would be an ineligible use of disaster loan proceeds. Structural or other changes which are necessary to comply with city, county, and state building construction codes are not considered to be upgrading.

SBA is required by statute to determine that the funds are used lawfully, and will require the borrower to furnish evidence of how the disaster loan funds are used. Any funds disbursed but not used as authorized to restore property to pre-disaster condition must be returned to SBA, and will be applied to reduce the principal balance of the loan. Legislation provides that "whoever wrongully misapplies the proceeds of a loan shall be civilly liable to the SBA Administrator in an amount equal to one-and-one half times the original principal amount of the land." Falsification of an application or false certification of use of proceeds may subject the applicant to criminal penalties.

An SBA disaster loan may not exceed the actual tangible loss suffered by the disaster victim (after deducting any recovery from insurance, the Red Cross, a state grant, permanent mini-repairs, or other sources plus eligible refinancing, expenses for code compliance, or eligible relocation expenses).

In addition, the SBA has established the following administrative limits:

1. Home Loans: A disaster home loan is limited to a maximum of $50,000 to restore a residence, plus $10,000 to restore residential contents, or $55,000 for both purposes, plus up to $50,000 for eligible mortgage refinancing. The cost of code compliance and eligible relocation are included within these dollars.
2. Business Loans: A disaster business loan is limited to a maximum of $500,000 for real and property losses.

Refinancing, code compliance, relocation expenses, and all other eligible loan purposes are included in this dollar limitation. Only the Regional Director of SBA can approve a loan in excess of this dollar limitation if he determines it is necessary to avoid undue hardship.

At this time, the interest rate on homeowner loans is 3% and the interest on business loans is 5%. Eligible mortgage refinancing is available at a rate of 7 3/8%.

A disaster loan may be limited by SBA to an amount that the applicant can repay. SBA can approve a loan only when there is reasonable assurance that the loan will be repaid. In Presidentially declared disasters certain disaster victims may not be financially eligible for SBA loans. In such a situation these victims are eligible for the Individual and Family Grant Program funded 75% Federal and 25% State and administered through the State.

Applications may be made at the Disaster Relief Center opened up in the area of the disaster.

FOR MORE INFORMATION:

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Small Business Administration
Towson, Maryland 21204

Agency: Soil Conservation Service

Flood Hazard Mitigation Responsibility:

Disaster Preparedness and Assistance

Flood Damage Reduction

Flood Control

Development and Redevelopment Policies

Information and Education

Discussion:

The U. S. Soil Conservation Service (SCS), through Public Law 83-566, the Watershed Protection and Flood Prevention Act, provides rural communities with technical and financial help in solving flooding and sedimentation problems.

PL 83-566 projects are limited to watersheds of up to 250,000 acres. In addition to flood prevention and sediment control, project purposes can include improved agricultural water management, municipal and industrial water supply, recreation, fish and wildlife development, water quality, and ground water recharge. Watershed projects can enhance environmental quality, maintain the resource base, and improve economic and social conditions.

Requests for small watershed projects are initiated by citizens and landowners through their local soil conservation district and county government. SCS plans and carries out projects in cooperation with the local sponsors and concerned local, state and federal agencies.

Under this program, SCS will pay all of the technical assistance costs associated with planning structural measures (such as dams, levees and grade stabilization structures) and land treatment measures (such as conservation cropping systems, waterways, diversions and spring developments). It will also pay for all of the construction costs associated with the flood prevention and water quality benefits; 50 percent of the recreation, agricultural water management, and fish and wildlife development costs; and none of the water supply costs.

SCS and the Maryland Department of Natural Resources, Flood Management Division, have a joint agreement to cooperate on flood hazard studies. SCS provides flood plain maps, water surface elevations, and related data on selected study areas.

On-going studies include a flood insurance study for Kent County for the Federal Emergency Management Agency and a flood hazard study for Mattawoman Creek in Charles and Prince George's Counties. Flood hazard studies have been completed for Western Run in Balitmore County (1975), Little Catoctin Creek in Frederick County (1978), Collington Branch in Prince George's County (1980), and Gwynns Falls in Baltimore County and Baltimore City (1981).

Flood insurance studies were completed for parts of Prince George's County and Worchester County in 1971.

FOR MORE INFORMATION:

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Soil Conservation Service
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College Park, Maryland 20740
(301) 344-4185

Publications:

Maryland Watershed Progress Report, USDA, Soil Conservation Service, College Park, Maryland, January, 1980.

Multiple-Purpose Watershed Projects; USDA, Soil Conservation Service, Washington, DC, December, 1975.

Agency: U. S. Water Resources Council

Flood Hazard Mitigation Responsibility:

Development and Redevelopment Policies

Flood Plain Management

Information and Education

Discussion:

The Water Resources Council was created through the Water Resources Planning Act of 1965 "to encourage the conservation, development, and utilization of water and related land resources of the United States on a comprehensive and coordinated basis by the Federal Government, States, localities and prvate enterprise with the cooperation of all affected Federal agencies, States, local governments, individuals, corporations, business enterprises, and others concerned."[1] This has been accomplished by:

1. direct grants to the States for water and related land use planning,
2. indirect grants to river basin commissions, and
3. policy guidance to establish national water policy.

The Council has provided major input into national flood plain management through the development of the Unified National Program for Flood Plain Management, first printed in 1976 and then revised in 1979. This report sets forth a conceptual framework and then identifies strategies fundamental to the implementation of flood plain management. Non-structural measures are given full attention. State and Federal actions are recommended to achieve a unified

[1]Water Resources Planning Act of 1965 42 U.S.C. 1962-1962a-3, Sec. 1962.

program of planning and action at all levels of government and to reduce flood losses and the loss of flood plain natural values.

In addition, the Council was designated as the agency to periodically evaluate the effectiveness of Federal agencies' implementation of Executive Order 11988, Flood Plain Management. Executive Order 11988, issued by President Carter in May 1977, establishes a general policy for Federal agencies to avoid uneconomical, unnecessary and hazardous use of flood plains. The Executive Order directs Federal agencies to:

1. avoid directly or indirectly supporting flood plain development,
2. avoid actions located in or affecting the flood plain, unless the flood plain location is the only practicable alternative, and
3. in the absence of a practicable alternative, require that actions must be designed or modified in order to minimize potential harm to or within the flood plain.

The Council also established an interagency intergovernmental Flood Plain Management Task Force. The Task Force performs a number of activities under the recommendations of the Unified National Program for Flood Plain Management, EO 11988 and related initiatives.

FOR MORE INFORMATION:

Contact:

Frank Thomas Timothy Maywalt

U. S. Water Resources Council
2120 L. Street, N.W.
Washington, D.C. 20037
(202) 254-6453

Publications:

A Unified National Program for Flood Plain Management, September, 1979, GPO.

Guidelines for Determining Flood Flow Frequency, (Bulletin 17B) Revised, available through NTIS, fall, 1981.

Estimating Peak Flow Frequencies for Natural Unguaged Watersheds - A Proposed Nationwide Test, available through NTIS, fall, 1981.

Regulation of Flood Hazard Areas to Reduce Flood Losses, Volume I, 1972, 5245-00008, GPO.

Regulation of Flood Hazard Areas to Reduce Flood Losses, Volume II, 1972, 5245-0010, GPO.

Regulation of Flood Hazard Areas to Reduce Flood Losses, Volume III, available through NTIS, fall, 1981.

Strengthening State Flood Plain Management, Patricia A. Bloomgren, available from NTIS, August, 1981.

Flood Plain Regulations - Legal Analysis: Cases 1969-1980, Dr. Jon A. Kusler, available from NTIS, August-September, 1981.

Local Innovations in Flood Plain Regulation, Dr. Jon A. Kusler, available from NTIS, September, 1981.

Flood Plain Management Handbook, available from NTIS, fall, 1981.

State and Local Acquisition of Flood Plains and Wetlands, available through NTIS, fall, 1981.

Cooperative Flood Preparedness, available through NTIS, fall, 1981.

"Watch Along the Watershed" (film), July, 1981.

"Steps in Flood Plain Management;" "Intergovernmental Management of Flood Plains;" "Flood Plain Management Techniques;" and "Flood Plain Management Regulations" (slide shows), available from member agencies of the U. S. Water Resources Council, 1980.

Integrated Flood Plain/Wetlands Management

Emerging Issues in Wetland/Flood Plain Management-Summary Report of a Technical Seminar Series, September, 1979, PB 80 129802, NTIS.

Emerging Issues in Wetland/Flood Plain Management-Supporting Materials for a Report of a Technical Seminar Series, September, 1979, PB 80 130404, NTIS.

Flood Plain Management Guidelines for Implementing EO 11988, February, 1979, WRC.

Assessment of Wetland Values, available through NTIS.

Sources of Wetlands/Flood Plain Research Information, October, 1980, PB81 112476, NTIS.

Scientists Report, National Symposium on Wetlands, Lake Buena Vista, FL, November 6-9, 1978, limited number of copies available from WRC, 1979.

"Wetlands of the United States;" "Why Wetlands Protection ?;" and "Wetland Protection Techniques" (3 slide shows), available from member agencies of the U. S. Water Resources Council, 1980.

Workshop Report on Bottomland Hardwood Wetlands, June 1-5, 1980, National Wetlands Technical Council, available through NTIS, August, 1981.

Non-structural Flood Plain Management

Impediments to Federal Sponsorship of Nonstructural Flood Plain Management and Flood Recovery Measures:

Nonstructural Flood Plain Managment Study: Overview, Dr. Gilbert F. White, October, 1979, PB 80 158538, NTIS.

Flood Plain Acquisition: Issues and Options in Strengthening Federal Policy, Dr. Jon A. Kusler, October, 1979, PB 80 158090, NTIS.

Improved Formulation & Evaluation of Nonstructural Elements for Water Resources Plans in Flood Hazard Areas, Dr. Leonard Shabman, October, 1979, PB 80 160120, NTIS.

Options to Improve Federal Nonstructural Response to Floods, Dr. Rutherford Platt, December, 1979, PB 80 160146, NTIS.

Nonstructural Measures in Flood Damage Reduction Activities, Dr. Gerald E. Galloway, July, 1980, PB 81 180424, NTIS.

The Influence of Regulations and Practices on the Implementation of Nonstructural Flood Plain Plans, November, 1980, WRC.

Guidelines for the Formulation and Evaluation of Nonstructural Alternative Plans, available through NTIS, fall, 1981.

Abbreviations Used:

GPO - U. S. Government Printing Office

NTIS - National Technical Information Service

Agency: Baltimore County Bureau of Civil Defense

Flood Hazard Mitigation Responsibility:

Local Flood Forecasting and Warning System

Discussion:

With the help of the National Weather Service, five rain gauge stations were set up throughout Baltimore County located in fire stations at:

1. Reisterstown (Gwynn's Falls),
2. Westview Station (Dead Run),
3. Hereford (Gunpowder),
4. Towson (Jones Falls), and
5. Fullerton (Headwaters of White Marsh, Stemmers Run and Red House Run).

In conjunction with this, staff gauges have been placed on several streams, and Watershed Studies have been made of major drainage areas.

The information from these manual stations is read once a day except during flash flood events, when stations report hourly readings. Using information from these stations, rainfall, radar information and current soil conditions, the National Weather Service Office at Baltimore-Washington International Airport analyzes the situation to determine if a potential flooding problem exists. This is coordinated with the Baltimore County Public Works Department, Storm Drain Design Division, in the Civil Defense Emergency Operating Center.

On the Patapsco River there is also interjurisdictional cooperation between Baltimore County, Anne Arundel County and Howard County to predict potential flooding problems upstream or downstream, based on an alarm gauge at Woodstock, staff gauges and the Patapsco River study performed by the Soil Conservation Service.

In the low-lying areas of the eastern side of the County prone to tidal flooding, colored maps showing two feet contours relate to tide level predicted by the Weather Service to the specific area involved, so that planned evacuations can be executed before the water rises too high.

Once a flooding situation has been declared, the County Executive has the authority to take the necessary actions. Evacuation and warning procedures are predetermined for specific areas dealing with each situation, for example, road flooding. The procedures are followed and implemented to provide adequate public information and protection to County residents.

FOR MORE INFORMATION:

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Storm Drian and Approval
Section
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Baltimore County Office
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Agency: Howard County Office of Civil Defense

Flood Hazard Mitigation Responsibility:

Local Flood Forecasting and Warning System

Discussion:

During Tropical Storm Agnes in 1972, Howard County experienced major losses totaling $744,854.[1] Based upon this loss, the National Weather Service selected Howard County as one of five flood-prone jurisdictions across the country to implement a flood warning system. In 1974, with the combined efforts of the Howard County Office of Civil Defense, the Howard County Stormwater Management Division and the National Weather Service, a flood forecasting and warning system was developed for Howard County.

Each fire station in the County was designated as a weather reporting station to record and report daily rainfall patterns from river rise step gauges. In addition, gauges were installed at flood indicator points in the County which are activated by rising waters. When activated these gauges trigger sensor alarms, which usually give two hours notice prior to flooding in downstream areas. Gauges are located at:

1. Middle Patuxent at Route 32 and Cedar Lane,
2. 200 feet downstream of the 108 bridge on the Little Patuxent,
3. Patapsco at the Woodstock Bridge, and
4. Deep Run Creek at Route 108.

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[1]Phone conversation with Gae Ray, Maryland Emergency Management and Civil Defense Agency.

These areas were selected based on past flooding problems. The central alarm system for these sensors is located at the Howard County Civil Defense Office.

When one of the sensors is activated the central alarm is alerted by light and sound. This alarm automatically notifies the director of Civil Defense and the Chief of Stormwater Management of the impending flood warning. Local police and firefighters are dispatched to the fixed gauges to measure the water level.

This information is sent to the Emergency Operations Center, set up in the Howard County Civil Defense Office to provide a central location for emergency operation functions. The County Civil Defense works with the County Stormwater Management Division using the incoming data from the fixed guages, weather forecasts from the National Weather Service and historical flood data to make determinations on the potential for a flood emergency.

If an emergency flooding situation is declared, a flood warning system is instituted and evacuation measures are initiated in phases. This includes the notification of neighboring County Civil Defense offices, the alerting of businesses and residents about the possibility of evacuation, and the assembling of local county officials at the Emergency Operations Center to coordinate activities. The final Phase is the announcement by the County Executive of a state of emergency and commencement of evacuation of the affected area. A current listing of residences is kept by each County Fire District for this purpose. The evacuation order is given by bull horns, lights, sirens and any other device available to ensure warning of all endangered residents.

The initial cost of the flood alarm guages was approximately $10,000. The Howard County Department of Public Works maintains the system to a cost of $4,000 a year, $1,000 per sensor.

FOR MORE INFORMATION:

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Director
Howard County Office of
Civil Defense

William Rommal,
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Howard County Office of
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Road, Bridges and Storm
Drainage Division
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(301) 992-2014

George Howard Building
3430 Court House Drive
Ellicott City, Maryland 21043

Agency: Susquehanna River Basin Commission

Flood Hazard Mitigation Responsibility:

Disaster Preparedness

Information and Education

Development and Redevelopment Policies

Discussion:

The Susquehanna River Basin Commission (SRBC) was created on December 24, 1970, when the President of the United States signed legislation which brought SRBC into existence as a federal/interstate compact with broad planning and regulatory powers over the 27,500 square mile river basin. The Susquehanna River basin encompasses portions of the State of New York (23% of the basin), the Commonwealth of Pennsylvania (76% of the basin) and the State of Maryland (approx. 1% of the basin). Representatives of these three states and the federal government constitute the Commission. Each has one vote; decisions are made by majority vote; most Commission actions have been unanimous.

The Commission has been responsible for a large number of flood hazard mitigation activities. Since only a small percentage of the Susquehanna River basin lies in Maryland, the majority of the activities are in the Pennsylvania and New York portions. However, these activities can be applied to, and used in, Maryland's flood hazard mitigation program. The activities are discussed as follows:

Analysis and Delineation of Flood Plain Areas

This includes performing a number of flood insurance studies. Studies for the towns of Port Deposit, Perryville, and Havre De Grace were performed by the Commission. The area of study included the reach from Port Deposit to Conowingo Dam on the Susquehanna River, the lower reach of Octoraro Creek, but did not include all of Harford and Cecil Counties along the Susquehanna.

Community Flood Plain Assessment and Flood Stage Mapping

The Commission has produced a series of Flood Plain Assessment Reports containing information pertinent to flood plain management efforts in selected communities. These reports include an analysis of flood plain land use in the community, structure and population counts and an assessment of current regulations and management practices. Flood stage mapping has been provided for some communities by delineating the extent of flooding which will occur when a given river stage is reached at one of the NOAA forecast locations. This delineation is made on 1" = 200' base maps used in the flood insurance studies. Flood stage mapping provides a tool for community officials during a potential flood incident and provides the opportunity to coordinate emergency planning and evacuation.

Flood Hydrology and Data Repository

The Commission staff maintains a data repository, and answers requests for site specific data and detailed flood hydrology and hydraulics.

Flood Damage Reduction Program

A general flood damage reduction manual is being developed to address types of flooding experienced by communities and possible methodologies to be applied for structural or non-structural solutions. Part of this effort is the establishment of a classification system for flood prone municipalities based on stream drainage areas.

Operational Self-Help Flood Warning Systems

With the coordination of local civil defense organizations and organizational and technical assistance, and equipment from the National Weather Service, self-help warning systems are operational in many watersheds in New York and Pennsylvania.

Enhanced Flash Flood Warning Program

The National Weather Service and the Appalachian Regional Commission are developing a pilot flash flood warning program in the Susquehanna River Basin in Pennsylvania.

Industrial Flood Damage Reduction

SRBC participated in the planning and technical review of a motion picture, slide/tape-cassette presentation and manual on industrial flood damage reduction. In addition, SRBC, working with a team of federal, state and regional agencies, inspected

several manufacturing plants located in the flood plain. Recommendations were made about self-help actions each plant could take to evacuate, elevate or protect equipment or inventory during flooding situations.

Hydrologic Data Coordination Committee

The Commission has established this committee to provide inter-agency coordination of hydrologic data, and to assist in resolving differences in hydrologic analysis and data interpretation. Certain information generated as a result of this activity may be helpful in hydrologic analyses in Maryland.

FOR MORE INFORMATION:

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Richard A. Cairo
Secretary to the Commission
Susquehanna River Basin Commission
1721 N. Front Street
Harrisburg, Pennsylvania 17102
(717) 238-0423

Publications:

Status of Flood Damage Reduction Programs and Projects, Since Agnes, Publication Number 31, October 1975.

"Flood Forecast and Warning System Evaluation," Final Interagency Task Force Report, Susquehanna River Basin, New York, Pennsylvania, and Maryland, Susquehanna Basin Flood Control Study, Publication Number 60, December 1978.

Recommendations for an Improved and Expanded Flood Forecasting System for the Susquehanna River Basin, Publication Number 6, September 1973.

Flood Vulnerability and Damage Index, Susquehanna River Basin, Publication Number 2, November 1972.

Flood Event in the Susquehanna River Basin, Publication Number 33, November 1975.

Neighborhood Flash Flood Warning Program, Publication Number 45, October 1976.

You Could Build an Ark, Publication Number 5, 1973.

Planning Guide for Self-Help Flood Forecast and Warning System, Swatara Creek Watershed, Pennsylvania, Publication Number 42, November, 1976.

Agency: The American Red Cross

Flood Hazard Mitigation Responsibilities:

Disaster Assistance

Post-Flood Recovery

Discussion:

The American Red Cross is an independent, voluntary organization dedicated to performing relief activities for the purpose of mitigating impacts on the individual and family caused by disaster. This responsibility is required by Congressional charter (Act of Congress of January 5, 1905, as amended, 36 U. S. Code 3, Fifty) as well as federal disaster legislation and is recognized in statements of understanding between the Red Cross and various federal disaster and civil preparedness agencies, and formal agreements between the Red Cross and various state and local governments.

The Red Cross provides both emergency mass care and assistance to individuals with urgent and verified disaster-caused needs. This help is given on the basis of uniform guidelines and procedures and includes utilization of available community resources, both public and private.

When government or other recovery aid is available, Red Cross help is limited to meeting emergency needs. The Red Cross assists disaster victims in obtaining government and other available assistance, but when such help is not available or is not adequate, the Red Cross will assist with additional recovery needs.

After a flood disaster has occurred, the Red Cross provides mass or individual shelter, clothing, food, first aid and other basic needs. All Red Cross help to disaster victims is an outright gift and requires no repayment.

There are four types of administrative units within the Red Cross. The chapter is the local unit and covers every community in the United States. The division is a group of chapters organized to facilitate services through a larger area. The national field office provides supervision, guidance, and technical assistance to divisions and chapters. The national headquarters has the responsibility for establishing and implementing policies and regulations that govern Red Cross activities, for giving administrative and technical supervision and guidance to the field offices, and for maintaining the organization's financial controls.

When a flood disaster occurs, the Red Cross chapter for that geographic area is responsible for initiating immediate action to meet disaster-caused human needs. Assistance is provided by divisions, national field offices and national headquarters.

The Red Cross must maintain cooperation with government at all levels. This was one of the basic foundations of the Red Cross as designated by the founder, Clara Barton. This cooperation has increased as the Red Cross has developed close ties with all of FEMA instead of the Civil Defense aspect alone. The Red Cross is now putting a greater emphasis on hazard

mitigation in addition to the classic emphasis on preparedness and response. The Red Cross has been an advocate for flood insurance and will be joining with the government in promoting the sale of flood insurance in certain flood prone areas.

FOR MORE INFORMATION:

Contact:

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Baltimore, Maryland 21218
(301) 467-9905

The American Red Cross
Anne Arundel County Chapter
Disaster Services
Glen Burnie, Maryland 21061
(301) 761-2140

The American Red Cross
National Headquarters
Disaster Services
18th and E. Street N.W.
Washington, D.C. 20006
(202) 737-8300

Agency: Department of Agriculture

Flood Hazard Mitigation Responsibility:

Post Flood Recovery

Discussion:

The Department of Agriculture is authorized to make low interest loans to farmers who have had farms damaged by a natural disaster if the Governor has declared a state of emergency. These loans may be made to rebuild, repair, or recover farmlands, buildings, crops or livestock damaged or destroyed by a natural disaster.

FOR MORE INFORMATION:

Contact:

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Annapolis, Maryland 21401
(301) 269-2161

Agency: Maryland Department of Economic and Community Development

Flood Hazard Mitigation Responsibility:

Disaster Assistance

Post Flood Recovery

Discussion:

Pursuant to Section 404(a) of the Disaster Relief Act of 1974 (PL-93-288), the Maryland Department of Economic and Community Development (MDECD) administers the Maryland Disaster Housing Assistance Program. This program is administered during Presidentially declared disasters and provides temporary housing and needs to flood victims after a flood has occurred. The Federal Emergency Management Agency provides the funds for this program.

Temporary housing includes motels, rental housing, Veterans Administration housing and Urban Development housing. Disaster victims are eligible for limited home repair grants if they can prove that they suffered structural damage to their properties as a result of flooding. Applications for these grants are processed at the Disaster Relief Center. Other needs are also provided, including furniture rental, dishes, sheets and towels. Application may be made for this aid to the Disaster Relief Center which open up in or near the area which had experienced the flood disaster. During Hurricane David, $122,000 was administered with $58,000 for administrative costs and $64,000 for grants.[1]

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[1]Phone conversation with MDECD.

FOR MORE INFORMATION:

Contact:

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Maryland Department of Economic and
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(301) 269-2875

Publications:

Disaster Temporary Housing Program, Phase I Applicant Assistance, U. S. Department of Housing and Urban Development, October, 1975.

Agency: Department of Health and Mental Hygiene

Office of Environmental Programs

Flood Hazard Mitigation Responsibility:

Regulatory Authority for Flood Plains

Discussion:

The Department of Health and Mental Hygiene (DHMH), Office of Environmental Programs, has regulatory authority incorporating flood hazard mitigation in four areas: the disposal of designated hazardous substances; water supply and sewerage systems; individual water supply and sewage disposal systems, and 201 facility design.

Regulations for the treatment, storage and disposal of designated hazardous substances are found in the Code of Maryland Regulations (COMAR) 10.51.06.B.

These regulations prohibit the location of a facility for the treatment, storage or disposal of a designated hazardous substance in a 100 year flood plain unless it has been demonstrated that the facility is designed, constructed, operated and maintained so that it will not be inundated by a 100 year flood. Facilities which existed before the regulations went into effect are regulated through the issuance of the Hazardous Waste Facility Permit which incorporates design criteria to prevent inundation from the 100 year flood.

Regulations for individual water supply and sewage disposal systems (COMAR 10.17.02.03) call for the protection of water supplies from flooding by using techniques such as sloping, ditching, dikes, or curbs.

Regulations for water supply and sewerage systems (COMAR 10.17.03.01) exclude land located in the 50 year flood plain and/or covered by mean high tide as a part of the lot area (defined as the total usable area within a lot).

For 201 facility design, all private and public sewage treatment and conveyance facilities must follow the requirements found in the Environmental Protection Agency Technical Bulletin.[1] These requirements are:

1. The potential for damage or interuption of operation due to flooding shall be considered when siting the treatment works.
2. Electrical and mechanical equipment shall be protected from physical damage by the 100 year flood.
3. The treatment works shall remain fully operational during the twenty five year flood if practical, but in no case shall less than a ten year flood be used.
4. Works located in coastal areas subject to flooding by wave action shall be similiarly protected from the maximum expected twenty five (25) and one hundred (100) year wave actions.

Implementation for this is achieved through the issuance of the State Construction Permit.

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[1] #18A-430-99-74-001

FOR MORE INFORMATION:

Contact:

Designated Hazardous Substances

Fred Sachs, Chief,
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Waste Manangement Administration
Office of Environmental Programs
201 W. Preston Street
Baltimore, Maryland 21201
(301) 383-5734

Individual water supply and sewage disposal; and water supply and sewerage systems

Jack Holthaus, Chief,
Division of Residential Sanitation
Water Management Administration
Office of Environmental Programs
(301) 383-2055

201 Facility Design

Dr. Ta-Shon Yu, Chief,
Design Review Division
Office of Environmental Programs
(301) 383-7659

Publications:

Design Guidelines for Sewerage Facilities, Office of Environmental Programs, Department of Health and Mental Hygiene, State of Maryland, 1978

Design Criteria for Mechanical, Electrical, and Fluid System and Component Reliability, (supplement to Federal Guidelines for Design, Operation and Maintenance of Wastewater Treatment Facilities under P. O. 92-500). Office of Water Program Operations, U. S. Environmental Protection Agency, Washington, DC

Agency: Maryland Department of Human Resources

Flood Hazard Mitigation Responsibility:

Disaster Assistance

Postflood Recovery

Discussion:

The Maryland Department of Human Resources is the designated agency in the State to administer the Individual and Family Grant Program authorized by Public Law 93-288, the Disaster Relief Act of 1974.

Once a flood has been declared by the President as a major disaster, a number of financial assistance programs are made available to the victims of the disaster. Section 408 of the Disaster Relief Act of 1974 provides for the Individual and Family Grant (IFG) program for disaster victims. The Governor has authorized the Department of Human Resources to distribute these grants to individuals and families who are unable to meet disaster related necessary expenses or serious needs in total amount not to exceed $5,000. These grants are 75% Federal share and 25% State share.

In order to qualify for an IFG, the disaster victim must demonstrate four eligibility requirements. First, the IFG program is not intended to indemnify losses. The grants are provided only to support financial aid for basic needs, not luxury or decorative items. These basic needs must have arisen from the disaster; therefore, the grants must be used to provide relief for disaster related needs. Verification of the uses of

the grants are undertaken once the grants have been distributed.

Second, the disaster victim must have been declared ineligible for a loan from the Small Business Administration Loan Program. Ineligibility through the Small Business Administration is determined if there is only personal property damage; and the applicant is unemployed and derives no more than 50% of their income from Social Security or Public Assistance. There may be other situations which would determine ineligibility. In addition, the applicant for the individual and family grant must not have refused other assistance, and must refund any portion of the IFG that is duplicated by other grants or insurance benefits.

Third, the applicant must provide proof of ownership of flood insurance if they reside in a special flood hazard area as designated by the Federal Emergency Management Agency. If they do not have flood insurance at the time of application, they must purchase the flood insurance at that time. A portion of the grant money may go towards the flood insurance premium. If the community in which the disaster victim resides has chosen not to participate in the National Flood Insurance Program, the grant may only be used for medical, dental or other personal needs.

And finally, field work and verification is necessary to provide proof that the needs are disaster-related, the grant is used for basic needs and no other grant or loan has been administered.

In the case of flood disaster or other type of disaster a central office of agencies is opened to provide disaster relief aid. These centers are located as near to the disaster area as possible. Manpower for these centers is provided by FEMA, SBA, Red Cross and Human Resources. Disaster victims can then apply to these and other agencies for aid. Applicants are handled on a priority basis.

Through December 29, 1979, $1,839,261 in disaster aid was disbursed to Tropical Storm David victims through the IFG Program.

FOR MORE INFORMATION:

Contact:

Office of Administration
Department of Human Resources
Baltimore, Maryland 21201
(301) 383-5096

Publications:

State of Maryland, Disaster Assistance Plan, Maryland Civil Defense and Emergency Planning Agency, September 1975.

Agency: Department of Natural Resources

- Maryland Forest Service
- Maryland Geological Survey
- Tidewater Administration
- Water Resources Administration
  - Flood Management Division
  - Watershed Permits Division
  - Dam Safety Division
  - Sediment and Erosion Control
  - Wetlands Division
- Capital Programs Administration
  - Land Planning Services
    - Park Planning
    - Scenic Rivers
  - Program Open Space
- Maryland Wildlife Administration
  - Save Our Streams

Flood Hazard Mitigation Responsibilities:

- Disaster Preparedness and Assistance
- Flood Damage Reduction
- Development and Redevelopment Policies
- Research
- Information and Education

The Department of Natural Resources contains a number of agencies which have flood mitigation responsibilities. Water Resources Administration has the major regulatory authority for

the State's flood management program, and provides technical assistance to local communities in the development of flood management programs at the local level. Both Maryland Geological Survey and Tidewater Administration serve as a source of research data and technical assistance. Maryland Forest Service and Capital Programs Administration incorporate flood hazard mitigation into their project planning process. Through the Maryland Wildlife Administration, Save Our Streams Program, flood hazard mitigation is accomplished primarily through public information and education on stream enhancement and preservation.

Agency: Capital Programs Administration

Flood Hazard Mitigation Responsibility:

Project Review to Assure Consistency with Flood Hazard Mitigation Activities

Discussion:

Within Capital Program Administration, (CPA), Land Planning Services (LPS) and Program Open Space (POS) both incorporate flood hazard mitigation into their project planning process.

Land Planning Services is responsible for park planning and implementation of the Scenic Rivers Program. During the planning stage of proposed park projects, attention is given to actions which reduce the impact of flooding. The planned acquisition of flood prone lands for park use and proposals for suitable recreational development in the flood plain are two ways in which flood hazard mitigation is considered in the planning of a park.

The Scenic Rivers Program was created under the Maryland Wild and Scenic Rivers Act (Natural Resource Article, Section 8-401 through 410) passed in 1966 for the purpose of protecting rivers of outstanding value in the State. Flood mitigation, in potentially hazardous flood zone areas, is addressed in the scenic river management plans. Recommendations are made for the local governmental jurisdiction to implement. With the exception of the Youghiogheny River, there is no regulatory authority under the act.

Program Open Space has the lead responsibility for submitting requests for capital improvement programs for all DNR agencies to the Department of State Planning by July 1 for the following fiscal year. Flood hazard mitigation activities may be included as projects within the Capital Improvements Program of Program Open Space.

POS is a funding program which provides financial support for the purchase of open spaces and recreational areas. In the selection of these areas, flood hazard mitigation is given consideration in determining the suitability of sites for recreation uses.

FOR MORE INFORMATION:

Contact:

Land Planning Services
(301) 269-3656

Frank Oslislo, Director

Gene Cheers, Chief
Park Planning

Rob Bushnell, Chief
Scenic Rivers Program

Program Open Space
(301) 269-2231

William Krebs, Director

Robert L. Sweeney
Capital Improvements Program

Capital Programs Administration
Department of Natural Resources
Tawes State Office Building, C-3
Annapolis, Maryland 21401

Agency: Maryland Forest Service

Flood Hazard Mitigation Responsibility:

Program Review to Assure Consistency with Flood Hazard Mitigation Activities

Discussion:

The Maryland Forest Service (MFS), is given the charge for flood prevention as a part of their original legislative charge in Natural Resources Article, Section 5-602. As a service agency, MFS integrates flood prevention into day-to-day forest management in the State. The proper planning and layout of logging roads and trails provides a strong foundation for flood prevention, supplemented by stabilization of these roads and trails during their use.

MFS works with the Soil Conservation Service in administering the goals of Public Law 93-566. This law requires agricultural water management through channelization in coastal areas and the combination of land treatment and impoundments in areas with more sloping terrain. Activities are coordinated with the Soil Conservation Service as the lead agency and the U. S. Forest Service. Projects which fit into this category include logging road layout and post-harvest stabilization, timber management, as well as coordinating efforts to retain as much of the forest base as possible. All forest resource management activities are directed with primary soil and water conservation objectives in mind.

Public Law 534, the Flood Control Act of 1944, designated eleven river basins to receive special funding for critical area stabilization. The Potomac River was one of the rivers to receive such designation. Funding is provided to the State from the U. S. Department of Agriculture, to furnish accelerated technical assistance with the primary emphasis on critical area stabilization and maintenance of forest cover for maximum hydrologic benefits. Forest management activities within the Potomac Flood Control Project include: tree planting; log road and skid trail layout; and post harvest stabilization, timber management and critical area stabilization.

FOR MORE INFORMATION:

Contact:

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Department of Natural Resources
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Annapolis, Maryland 21401
(301) 269-3776

Agency: Maryland Geological Survey

Flood Hazard Mitigation Responsibility:

Information and Education

Research

Discussion:

Maryland Geological Survey (MGS) provides research, technical assistance, information and education through the Hydrogeology and Hydrology Program, in cooperation with the U. S. Geological Survey. This program provides the maintenance of a statewide water data network and the investigation of hydrologic and geologic characteristics of Maryland Water Resources. Flood hazard mitigation is provided through the development and availability of a data base on minimum, maximum and average stream flow data.

MGS has been involved in the following flood hazard mitigation related projects:

Stream-Flow Gaging Network: This network operates and maintains 82 continuous-record stream-gaging stations. In addition, 15 crest-stage, partial-record stations are operated. Data from these stations for the 1980 water year were compiled and published in "Water Resources Data for Maryland and Delaware" U. S. Geological Survey Water - Data Report MD-DE-80-1.

Revision of Flow Characteristics of Maryland Streams: This is a cooperative effort with the U. S. Geological Survey to revise and up-date MGS report of Investigations No. 16 (1971): Flow Characteristics of Maryland Streams.

The revision (RI No. 35) will include a convenient and reliable technique for estimating the magnitude and frequency of natural floods for Maryland Streams. According to MGS, the new methods represent a significant advance over prior techniques, particularly with respect to small watersheds. Current methods of analysis deal with very little data for drainage basins under a 10 square mile area and practically no data for basins under 2 square miles. The new report should be available by early 1982.

Information Requests: All data on file with the MGS - USGS Cooperative Water Resources Program is considered open-file information. This information is available to representatives of local, State and Federal government as well as private industries, consultants, ad hoc citizen groups and individuals.

FOR MORE INFORMATION:

Contact:

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Hydrogeology and Hydrology
Maryland Geological Survey
The Johns Hopkins University
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(301) 338-7105

Agency: Maryland Wildlife Administration, Save Our Streams

Flood Hazard Mitigation Responsibility:

Information and Education

Discussion:

Save Our Streams (SOS), a project originated by the Isaac Walton League, is now administered through the Maryland Wildlife Administration. The main purpose of SOS is to give individuals and organized groups the opportunity to evaluate local resources and initiate stream quality improvement towards the goal of the restoration and protection of Maryland waterways. This is accomplished through watershed management practices such as soil stabilization, streambank protection, low level stream devices and a reduction of pollution discharges.

SOS provides information to citizens on many issues which have direct flood hazard mitigation impact. Some of these activities include:

1. Providing citizens with information on evaluating proposed waterway construction projects, flood plain alteration projects, and techniques for public comment to proposed regulations on the WRA Permit Program.
2. Sponsoring workshops to acquaint the public with the restoration of urban streams.
3. Setting up a flood warning system in S.W. Baltimore County for flooding on small streams.
4. Sponsoring a workshop on floodproofing, to educate citizens on available floodproofing techniques.

5. Preparation and distribution of public information.

6. Involvement in the creation of the stream valley park, White Marsh Run Stream Valley Park, E. Baltimore.

In addition SOS is involved with research and report preparation of watershed management activities, and distributing this information to the public.

FOR MORE INFORMATION:

Contact:

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Save Our Streams
Maryland Wildlife Administration
Department of Natural Resources
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Annapolis, Maryland 21401
(301) 365-5926 (Gwynnbrook)

Publication:

An Integrated Watershed Management Policy for Baltimore County, MD, Maryland Wildlife Administration, Maryland Department of Natural Resources, February, 1980.

Agency: Tidewater Administration

Flood Hazard Mitigation Responsibility:

Information and Education

Research

Discussion:

The Tidewater Administration has the responsibility for the administration of Maryland's Coastal Zone Management Program required through the Federal Coastal Zone Management Act of 1972. Attention to flood management is called for in Section 13 of the Coastal Zone Management Program:

> "To give priority to non-structural management techniques for controlling tidal and riverine flood hazards, including the use of flood plains for open space used such as agriculture, forestry, wildlife habitat and recreation, in order to lessen the danger to life and property, and to minimize adverse effects on biological resources and water quality."

The Tidewater Administration achieves this charge primarily through the provision of technical assistance to other agencies to ensure coastal zone management concerns are adequately addressed.

At this writing, there are number of recently finished and on-going projects involving flood hazard mitigation which the Tidewater Administration is involved with. A discussion of these projects follows:

Jones Falls Watershed Study: A contractual study was undertaken for $25,000 in conjunction with WRA to provide technical information needed for development of a watershed management plan in the Jones Falls watershed in Baltimore County and Baltimore City.

Winters Run Watershed Plan: A model watershed management plan for areas with future development pressures is being developed for Winters Run in Harford County. This watershed management plan will fit the requirements of the Flood Hazard Management Act of 1976 and serve as a prototype for the development of other watershed plans. This is being funded for $10,000 with funds from the State's Coastal Zone Management grant.

Coastal Area Assistance: Tidewater Administration is working with Water Resources Administration to promote the completion of federal mapping efforts for the coastal areas in order that the location of the 100-year flood plain is delineated. Dorchester County has received over $20,000 in Coastal Zone Management funds from NOAA to provide markers for potentially hazardous flood prone areas. The lack of relief in coastal areas such as Dorchester County often causes serious problems during flooding events. The markers should provide easier identification. A similar project with $20,000 in funding is being initiated in Somerset County.

Coastal Stormwater Management: The Department of Civil Engineering, University of Maryland is performing a study on coastal stormwater management from May 1980 through December 1981 for $60,000. The purpose of this study is to identify appropriate stormwater management measures for coastal areas in Maryland. As part of this study, existing flood predictive models were examined for their

applicability in low relief coastal areas such as Maryland's Eastern Shore.

Erosion and Sediment Control Assistance: During FY 81, the WRA Erosion and Sediment Control Division with $20,000 in Coastal Zone Management grant funding reviewed the state of the art of sediment control measures in order to refine the State sediment control program, particularly the Standards and Specification Manual. In FY 82 $35,000 in funding is being provided to refine and accelerate the State's review of local sediment control programs.

Remapping of Coastal Communities: The Tidewater Administration has been a major source in the funding of the remapping of the flood insurance maps for counties. Overlays are being produced which conform to the scale of the County tax maps, 1" = 600'. The orginal scale of the flood insurance maps is 1" = 2000'. At this writing, Dorchester, Somerset, Worchester and Caroline Counties have been completed under this project.

Prince Georges County Watershed Plans: Funding has been provided to Prince George's County to assist the development of watershed management plans for Henson Creek, Western Branch and Piscataway Creek.

Flood Damage Inventory: Funding has also been provided to Prince George's County to undertake an inventory of flood prone properties. This will provide a data base to assess the potential magnitude and frequency of flood damage in the county. This project also serves as a

model for replication in other parts of the state.

Project Review: The Coastal Resources Division reviews projects applied for under the State's watershed permit program to ensure their consistency with the State's coastal zone management program. Similarly, Tidewater Administration reviews projects submitted through State clearinghouse for their consistency with the State's coastal zone management program including the review of the institution of appropriate flood hazard mitigation measures.

FOR MORE INFORMATION:

Contact:

Earl Bradley or David Burke
Intergovernmental Relations
Tidewater Administration
Department of Natural Resources
Tawes State Office Building, C-2
Annapolis, Maryland 21401
(301) 269-2784

Agency: Water Resources Administration

Within Water Resources Administration the following have flood mitigation and storm water management responsibilities:

Flood Management Division

Watershed Permits Division

Wetlands Division

Dam Safety Division

Erosion and Sediment Control Division

The activities of these divisions are discussed in the following narrative.

Flood Management Division

Flood Hazard Mitigation Responsibility:

Technical Assistance for Watershed Planning

Flood Insurance Program Coordination

Information and Education

Discussion:

The Flood Management Division provides technical assistance to local governments for watershed planning, coordination at the local and Federal level with the National Flood Insurance Program and information and education to public and private groups and individuals.

Watershed Planning - The Flood Management Division provides technical assistance to local governments in the implementation of the Flood Hazard Management Act of 1976. This is the regulatory authority in the State for watershed planning.

This Act (Natural Resources Article, Sections 8-9A-01 et seq.) provides the authority for both State and local government comprehensive flood management in areas subject to tidal and non-tidal inundation. The policy and purposes of this law are for the State: to assist in the guidance of development to minimize the impacts of flooding; to provide State guidelines and technical assistance to local governments in the management of flood hazard areas; to provide for comprehensive watershed management; to facilitate implementation of projects for flood control; to encourage and provide for local government units to manage flood-prone lands in a comprehensive manner; to provide for the biological and environmental quality of the watersheds of the State; and to establish a grant program to assist local jurisdictions with implementation of those capital projects included within the comprehensive flood management plans which were adopted and approved in accordance with requirements of the Act.

The policies of the Act are to be carried out by the State and local subdivisions in the sequence described below.

First, the Department of Natural Resources (DNR), cooperating with the Departments of State Planning and Agriculture is required to divide the State into watersheds for flood control planning and management.

After the watersheds have been designated, DNR (through Water Resources Administration, Flood Management Division) will conduct watershed studies in each watershed to define, the magnitude and frequency of flood events based on both existing and planned development, and alternative management techniques for controlling

floods and minimizing flood damage. These studies include the delineation of flood hazard areas on maps showing areas of tidal and non-tidal inundation, using the 100-year flood event as a minimum.[1]

Flood Management techniques may include flood control dams; levees and dikes; storm water detention or retention structures; flood warning systems; public acquisition; flood proofing; storm drain and stream maintenance; tax adjustment policies; subdivision, zoning and related ordinances; and other practical methods.

Based upon these watershed studies each local jurisdication is required to prepare a flood management plan based upon an evaluation of the alternative management techniques and other findings included in the DNR watershed studies.

The flood management plans must give consideration to a reduction of existing flood hazards, prevention of future flood hazards, preservation of the environmental qualities of the watershed, and economic and social development.

In an interjurisdictional watershed, DNR will group the sections of the submitted flood management plan that pertain to the specific watershed and review them as one plan.

The watershed studies and plans must be coordinated with related programs including the flood insurance program, the State sediment control program and the State water pollution control and abatement programs.

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[1]"100-year flood event" means a flood that has a 1 percent chance of being equalled or exceeded in any given year.

Each locality must implement its own flood management plan including the adoption of local ordinances as necessary. At the local government option, DNR may prepare rules and regulations to implement the local flood management plan.

Based upon amendments to the Flood Hazard Management Act in 1979 and 1980, a grant program is provided by DNR to fund watershed studies and flood management capital projects, (described previously) provided the projects are part of a comprehensive flood management plan.

To receive a grant, the flood management plan (for which grants fund are requested) is subject to review and approval by DNR, the Board of Public Works must approve all proceeds used for these funding purposes and the locality must be participating in the flood insurance program.

Greater emphasis is given to capital projects which 1) are permanent solutions to existing flood hazards and will not require continuing operation, maintenance or repair; and 2) minimize environmental impacts. An example of this is the acquisition of consistently flooded properties.

DNR, acting through the Board of Public Works, may provide up to 50 percent of the non-federal share of the funding. The locality must provide a local fund match of at least 50 percent to the DNR grant. The application is subject to review through State Clearinghouse (reference the DSP discussion). Priority of capital projects is to be determined through adopting an annual State priority list by DNR (for a graphic presentation of the sequence of events of implementation of the Flood Hazard Management Act, see Figure A-1).

The Flood Hazard Management Act of 1976 requires extensive State-local coordination and cooperation to achieve flood management purposes. The State is to provide technical assistance during the planning stage and financial assistance during the project implementation. However, decisions and implementation which affect development are a local responsibility.

Contractor for Flood Studies - The Flood Management Division has the responsibility for performing flood insurance studies for FEMA as contracted for by Water Resources Administration with Federal Emergency Management Agency (FEMA). These studies involve the analysis of the frequency of flooding and the degree of hazards represented by potential flooding events. This information is presented on maps of the communities studied, for use by FEMA in making flood insurance available and in assisting the communities in flood plan management.

Flood insurance studies have been completed for four counties and eight incorporated communities within these counties under two separate contracts. The Division is presently preforming studies for three additional counties and five incorporated communities within these counties.

Technical Assistance - Technical assistance is provided to local governments and the public in the form of engineering analysis, public information and planning for flood management activities.

Hydrologic and hydraulic studies are conducted for watersheds in the State by using several computerized modeling programs; (for a brief description on these programs, reference the SHA discussion).

Field surveying and stream gauge information provides some of the data for these studies. Stream gauge information is analysed and is available for public use.

The Flood Management Division also provides assistance and information to local governments and private citizens concerning watershed technology aspects of the flood insurance program, and development and implementation of the flood management watershed plans.

Coordination with the National Flood Insurance Program - The Flood Management Division also provides the coordination at the State level for the National Flood Insurance Program. Assistance is provided to local governments and private citizens in understanding the rules and regulations of the flood insurance program. (For more information refer to the discussion on the Flood Insurance Program, Federal Emergency Management Agency).

FOR MORE INFORMAITON:

Contact:

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Flood Management Division
Department of Natural Resources
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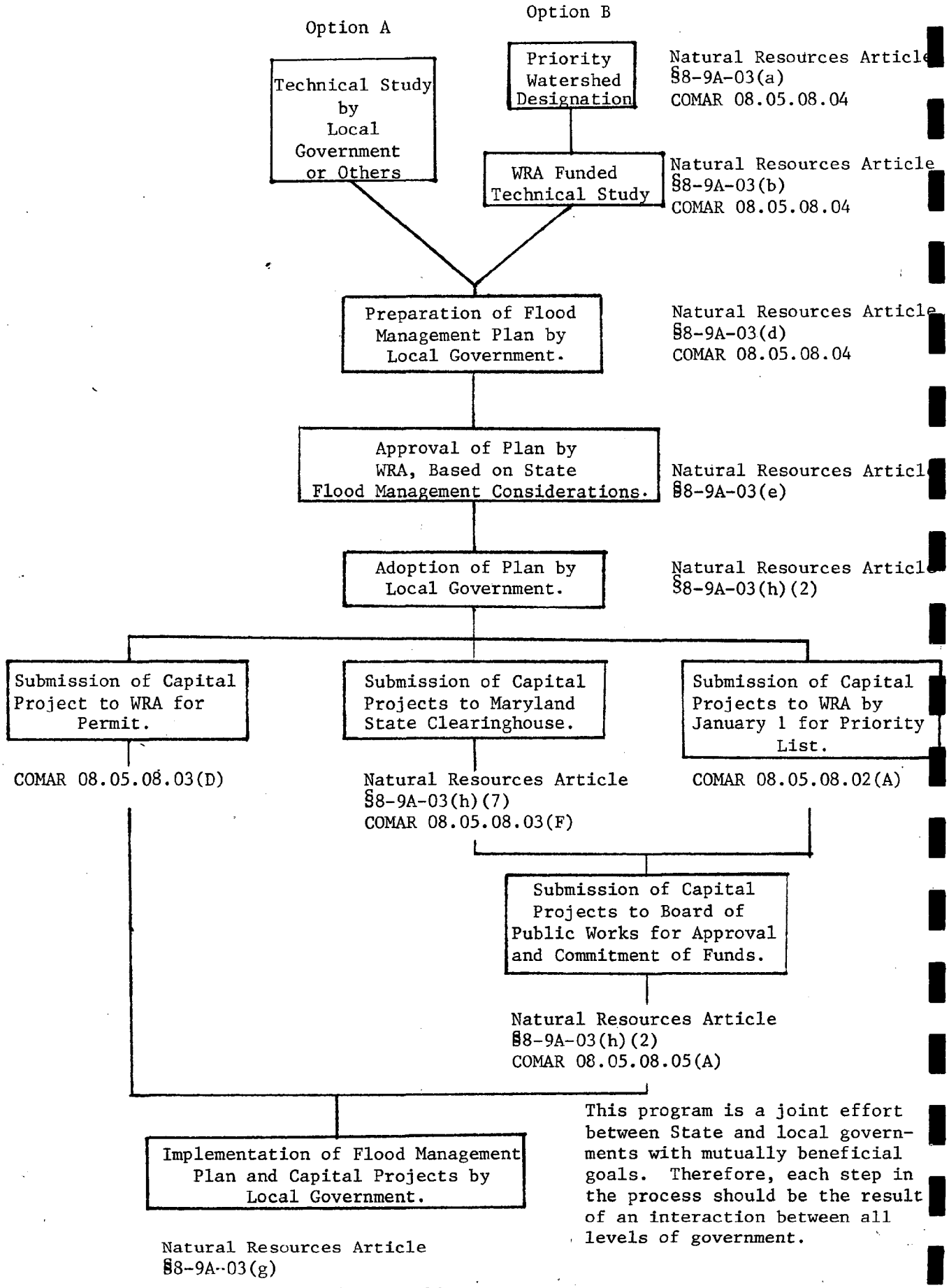
Annapolis, Maryland 21401
(301) 269-3825

Figure A-1

FLOW CHART FOR ACTIVITIES UNDER THE FLOOD HAZARD MANAGEMENT ACT



Agency: Water Resources Administration

Erosion and Sediment Control Division

Flood Hazard Mitigation Responsibility:

By-Product of Normal Activities

Discussion:

The Erosion and Sediment Control Division of WRA oversees the State Grading and Sediment Control Program. This includes coordination with and technical assistance to the Soil Conservation Districts, the local sediment control plan approving body.

Through a 1971 DNR Attorney Generals Opinion, authority was vested in the Soil Conservation Districts to regulate proposed earth changes so as to control erosion and siltation and eliminate sediment pollution--"the intent to impose sediment control measures to ameliorate and retard storm water runoff." [56 Opinions of the Attorney General 478, 479 (1971)].

This conclusion was based on the logic that storm water runoff causes stream channel erosion, that erosion produces silt and sediment, and that, therefore, to control erosion and siltation and to eliminate sediment pollution the Districts and the State might require storm water management measures in approving proposed earth changes on State and Federal projects.

Through this opinion the Erosion and Sediment Control Division may provide review and direction for storm water management to the local jurisdiction and the Soil Conservation Districts.

FOR MORE INFORMATION:

Contact:

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Annapolis, Maryland 21401
(301) 269-2224

Publication:

Standard and Specifications for Soil Erosion and Sediment Control in Developing Areas, prepared by U. S. Department of Agriculture, Soil Conservation Service, July 1975.

Agency: Water Resources Administration

Watershed Permits Division

Flood Hazard Mitigation Activity:

State Regulation for Flood Hazard Areas

State Regulation for Stormwater Management on State Construction Projects

Discussion:

In accordance with Natural Resources Article, Section 8-803, the watershed permits program regulates the construction or repairs to dams or reservoirs and any changes in the course, current or cross section of streams or surface water, or obstructions to non-tidal rivers or streams including their 100-year flood plain (that portion of land which has a 1 percent or greater chance of flooding in any given year). Through this program, construction activities are regulated in the 100-year riverine flood plain.

This program applies to drainage areas of more than 400 acres or if a trout stream, more than 100 acres. Additionally, permits are required for all construction projects which lie in designated special flood hazard areas.

In October, 1978, the Federal Insurance Administration approved the Maryland Water Resources Administration's "Rules and Regulations Governing Construction on Non-Tidal Waters and Flood Plains" promulgated pursuant to Section 8-803 of the Natural Resources Article as meeting the minimum requirements of the National Flood Insurance Program. The Federal Insurance

Administration was assured that the Maryland method of evaluating flood plain encroachments would adequately regulate new construction in the floodway or the 100-year flood plain. As part of the agreement and approval, the Water Resources Administration agreed to adopt and enforce the FIA flood hazard boundary maps and flood insurance rate maps as a minimum tool for delineation of flood plains. Where more restrictive maps have been developed by WRA, waterway construction permits are evaluated based on the more restrictive and accurate flood hazard map.

A Water Resources Administration Waterway Construction Permit is required of developer or land owner for any construction within a non-tidal flood plain regardless of the community's participation in the National Flood Insurance Program. Since the Federal approval of the Maryland permitting program, those communities qualifying as non-tidal may satisfy their obligations for the NIFP by adopting a resolution which 1) recognizes the State's authority or regulates flood plain construction and 2) requires evidence of a State Waterway Construction Permit before any local permits are issued for construction in the flood plain. The communities retain the right to be more restrictive but may not override a State decision and allow construction which has been prohibited by the Water Resources Administration.

Following this discussion, Table A-1 presents permit information for FY 1976 through 1982 (as of October 1981). This information should provide an understanding of annual amount of permit requests received and the amount of issued permits for activities which would be located in a 100 year flood plain.

Natural Resources Article, Section 8-905, requires stormwater management on all State financed or constructed projects that create additional flood hazards. Specifically, the statute requires that before actual construction of all State construction projects or State financed construction projects, the Department must determine whether the project creates surface water run off which may cause on-site or downstream flooding hazards, taking into consideration natural conditions, existing storm drainage, future development of the watershed, and flood control structures. If the Department determines that additional flood hazards will be created by the project and these hazards cannot be mitigated by natural features, the Department is to require that stormwater management or retention measures by included in the project. To implement this program the Water Resources Administration published in November, 1977, a "Maryland Interim Watershed Management Policy" which included generalized design criteria for stormwater management. These criteria have been used in implementing stormwater management programs for State financed and State assisted construction projects as provided for in the statute.

FOR MORE INFORMATION:

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TABLE A-1

NON-TIDAL WATERSHED PERMITS
(FY'76-82*)

| TYPE OF PERMIT | 1976 PERMIT REQUESTS | 1976 PERMITS ISSUED | 1977 PERMIT REQUESTS | 1977 PERMITS ISSUED | 1978 PERMIT REQUESTS | 1978 PERMITS ISSUED | 1979 PERMIT REQUESTS | 1979 PERMITS ISSUED | 1980 PERMIT REQUESTS | 1980 PERMITS ISSUED | 1981 PERMIT REQUESTS | 1981 PERMITS ISSUED | 1982* PERMIT REQUESTS | 1982* PERMITS ISSUED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OB | 8 | 8 | 2 | 2 | 2 | 2 | | | | | 4 | 2 | | |
| WC | 211 | 211 | 469 | 380 | 138 | 137 | 114 | 108 | 200 | 126 | 240 | 148 | 38 | 12 |
| TC | 23 | 25 | 150 | 148 | 245 | 223 | 139 | 131 | 135 | 124 | 167 | 146 | 45 | 36 |
| MR | 140 | 140 | 118 | 118 | 115 | 114 | 92 | 89 | 128 | 121 | 196 | 182 | 74 | 54 |

*As of October 1981.

SOURCE: Water Resources Administration, Data Processing.

K E Y

OB - Waterway Obstruction Permit - for any type of dam.

WC - Waterway Construction Permit - for changes in a stream channel or in the 100-year floodplain. Examples include filling of floodplains for property utilization and channelization projects.

TC - Temporary Waterway Construction Permit - for temporary stream crossings where there is no change in the cross-section of the stream after completion. An example would be the placement of sewer lines.

MR - Maintenance and Repair, Alterations Permit - for alterations to a stream channel. Examples include lining a channel with rip rap, sediment removal and culvert repairs.

Agency: Water Resources Administration

Dam Safety Division

Flood Hazard Mitigation Responsibility:

State Regulation of Dams and Reservoirs

Discussion:

Since 1977, the Maryland Water Resources Administration has actively been developing and implementing a dam safety review program. With Federal funding impetus and with State support, preliminary inspections have been completed for 58 dam structures.

Overall, the field and file review of these structures indicate that no dams in Maryland pose imminent threats.

All dams or impoundments are categorized by Class 1, 2, or 3, or high medium or low hazard. These class or hazard categories identify the structure by the potential for property damage and loss of life should the structure fail. Class 1 (high hazard) structures have the potential to cause extensive property damage or loss of life should the structure fail. Class 2 (medium hazard) structures are those which could result in extensive property damage or possible loss of life if the structure should fail. Class 3 (low hazard) structures are those which would result in minimal property damages should the structure fail.

Most Class 1 structures in Maryland have been evaluated on the basis of, and in conjunction with, the National Dam Inspection Program, implemented by the U. S. Army Corp of Engineers. The

other 27 (class 2 and 3) structures have been evaluated under the State's continuing Dam Safety Program.

Six of the Class 1 structures were recommended for extensive hydraulic and hydrologic evaluations to make recommendations to correct spillway deficiencies. Four of the evaluations are complete or underway. The remaining are awaiting owner funding for further studies. The Administration is working with Maryland State Emergency Management and Civil Defense Agency to implement an adequate warning system at these two structures during the interim.

The Dam Safety Division evaluates each dam or impoundment based on criteria that include the adequacy of the spillway (using mathematical models to simulate a design flood condition), danger reach (area, property and life, that would be affected if a structure fails) and other field investigation factors (visible erosion, seepage, settlement or cracking, and operations, valves and other working parts). Based on the field evaluations and the office computations, recommendations are being made to dam owners to correct the deficiencies or put in place monitoring systems to assure these dams and impoundments are operated and maintained safely. As the statewide inventory becomes complete, the Dam Safety Division will be establishing a priority list monitoring and evaluating each structure periodically.

FOR MORE INFORMATION:

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Agency: Water Resources Administration

Wetlands Division

Flood Hazard Mitigation Responsibility:

Coordination with Federal Regulation of Wetlands Areas Management

Discussion:

The Wetlands Division coordinates, at the State level, with the Section 404 Permit Program (after Section 404 of the Water Pollution Control Act Amendments of 1972). This regulatory program, administered by the Army Corps of Engineers, requires permits for the location of any structure in navigable waters,[1] and the excavation or discharge of dredged or fill materials in waters of the United States.[2]

A Memorandum of Agreement exists between the Baltimore District of the Army Corps of Engineers and Water Resources Administration for the coordination of a joint permit review program. This agreement sets up the permit approval procedure. The WRA Wetlands Division participates in monthly meetings to discuss and review projects, including 404 applications.

Since lands which come under wetland status are usually flood plain lands, the 404 Permit Program provides a regulatory

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[1]Navigable waters include waters of the United States that are subject to the ebb and flow of tide.

[2]Waters of the United States include coastal and inland waters, lakes, rivers and streams that are navigable waters of the United States, including adjacent waters. Typical activities which require permits include: bulkheads, dams, dikes, weirs, dredging, filling, groins and jetties, levees and rip rap.

tool as a flood hazard mitigation measure. For additional information on the 404 Program, reference the discussion on the Army Corps of Engineers.

In March 1980, the Wetlands Division, in conjunction with the Coastal Resources Division, Tidewater Administration, completed a study entitled Non-Tidal Wetlands Study of the Patuxent River Watershed. This study consisted of an inventory of non-tidal wetlands in the Patuxent River Watershed and investigation of alternative methods of protecting them.

This study originated out of a concern for the protection of non-tidal wetland resources in Maryland, and more specifically in the Patuxent River Watershed, and the passage by the Maryland General Assembly of Senate Joint Resolution No. 18 (1979). The Resolution mandated the Water Resources Administration to:

1. determine the extent and location of non-tidal wetlands in the Patuxent River Watershed,
2. provide recommendations and any applicable suggestions for legislation to protect these non-tidal wetlands and
3. give consideration to protection of these non-tidal wetlands through administration of Water Resources Administration Programs.

The study concluded that only 9% or 449 acres of the inventoried non-tidal wetlands in the Patuxent River Watershed do not fall within the regulatory powers of the Watershed Permits Program governing activities within the 100-year flood plain. Therefore, the study recommends that there is adequate

capability for regulation of non-tidal wetlands through the Watershed Permits Program. This study ties together flood plain management and protection of wetlands by identifying Water Resources Administration's regulatory flood plain management program as a management tool for protecting non-tidal wetlands.

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Publications:

Non-Tidal Wetlands Study of the Patuxent River Watershed, (Report of the Water Resources Administration submitted to the Maryland General Assembly in response to Senate Joint Resolution No. 18), March 1980

Agency: Maryland Department of State Planning

Flood Hazard Mitigation Responsibilities:

Development and Redevelopment Policies

Recreation and Open Space Planning

Information and Education

Discussion:

The Maryland Department of State Planning (DSP), has a number of on-going activities and responsibilities which incorporate flood hazard mitigation activities. A discussion of these activities and responsibilities follows:

Capital Improvement Programs

The Department of State Planning has the responsibility for review and development of funding priorities for State funded capital projects. State agencies must submit their requests for authorizing legislation to DSP by September 15 for the following fiscal year. DSP reviews these projects and determines the priorities for funding. This is submitted to the Governor's office as part of the "Capital Program." The Governor's office decides which projects to include in the Governor's budget request to the General Assembly.

Flood hazard mitigation activities may be included as a project in the Capital Program and would be funded by enactment of debt authorization (separate bond bill) for the comprehensive flood management grant program.

Clearinghouse Review

By order of the Governor, the Department of State Planning was designated as the A-95 State Clearinghouse and as the State Central Information Reception Agency.

As the State Clearinghouse, the Department is responsible for coordinating the review of designated federally assisted projects, programs, draft environmental impact statements, Federal development projects, and State plans which are specified for Gubernatorial review by the Federal Government. This review incorporates attention to activities within a 100-year flood plain.

As the lead review medium, the Maryland State Clearinghouse is to be viewed as a service organization for facilitating the coordination and exchange of information between the various levels of government and governmental agencies and as a source of information on Federal domestic assistance programs. The Clearinghouse itself is not a review agency nor does it act as an approving agency as it has neither the responsibility nor the authority to make final determinations on plans, projects or programs. The final determination as to whether a proposed project or program will be approved and funded rests entirely with a Federal or State funding agency.

As the State Central Information Reception Agency, the Department is responsible for receiving and disseminating information on Federal grants-in-aid awarded in Maryland and any other information made available concerning Federal domestic

assistance programs.

All projects require an environmental effects report and within this it must be documented whether a project is located within a 100-year flood plain area.

Intervention

DSP has the authority to become involved in administrative or judicial proceedings concerning land use, development or construction. These proceedings may involve the adoption of the comprehensive plan, zoning ordinance text, subdivision regulation text, comprehensive mapping of zones; and participation in certain individual proceedings such as zoning map amendments, special exceptions and variances and the administration of subdivision regulations. The Department will participate only when it appears that the Department's views would be of assistance in reaching an appropriate decision, and when a substantial State interest or interjurisdictional impact is present. Local subdivisions are required to notify the Department of State Planning "of applications for zoning, permits, or authority to use, develop or construct upon land which involves more than local impact and is of substantial State and regional interest."[1]

Areas of Critical State Concern Program

The Critical Areas Program was mandated by the State Land Use Act of 1974 (Article 88C, Section 2 (b)(3)) which gives the Department of State Planning the responsibility to identify

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[1]Article 88C of the Annotated Code of Maryland

Areas of Critical State Concern based upon recommendations from local governments of areas which should be designated by the State as Critical Areas. The Department may select a "generic class" such as flood hazard areas, which within specific critical areas may be identified and designated by the Secretary for special management attention.

State Development Council

Governor Hughes created this council through an Executive Order to derive a consistent State development policy. The Council is composed of the Secretaries of Planning, Economic and Community Development, Health and Mental Hygiene, Agriculture, Natural Resources and Transportation, and the Lieutenant Governor. The Council is chaired by the Secretary of State Planning. A draft Executive Order was prepared proposing policies addressing issues of concern which would affect overall general development patterns in the State. Flood and stormwater management have been identified as issues of concern in managing the future development of the State.

State Comprehensive Outdoor Recreation Plan

This plan develops the framework for acquisition and development of state lands for recreation and open space. The plan is coordinated with Program Open Space within the Department of Natural Resources. It also provides guidance for Federal, local and private decisions related to recreation and open space within the State.

Technical Assistance

Regional DSP planners work to aid local governments in developing policies which reflect State planning goals and policies. This could incorporate flood hazard mitigation planning.

Special Projects

The Patuxent River Policy Plan

The Patuxent River Policy Plan will provide management goals and objectives for flood plains located within the Patuxent River Basin.

Emergency Management

The Department of State Planning coordinated the activities of the Governor's Interagency Task Force on Emergency Management. The findings and recommendations of the Task Force were published in an October, 1980 report entitled, "Emergency Management in Maryland." Three of the recommendations were included in a recently enacted Administration bill, the Emergency Management Act (Senate Bill 830).

One provision of the Emergency Management Act is the creation of an Emergency Management Council. The purpose of the Council is to advise the Governor on emergency management issues. The Department of State Planning plans to serve on the Council.

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Publications:

Overall Program Design for Flood Recovery, Rehabilitation and Prevention, Maryland Department of State Planning, October, 1972.

Summary of Flood Related Studies in Maryland, Maryland Department of State Planning, Revised Edition, June 1974.

Regulating Flood-Prone Land in Maryland, Maryland Department of State Planning, May, 1975.

Maryland's Planning Program for Flood Recovery, Rehabilitation and Prevention, Maryland Department of State Planning, December, 1975.

Maryland State Clearinghouse Procedures and Operations Guide, Maryland Department of State Planning, November, 1978.

Emergency Management in Maryland, Report of the Governor's Interagency Task Force on Emergency Management, October, 1980.

Agency: State Highway Administration

Flood Hazard Mitigation Responsibility:

Development and Redevelopment Policies

Flood Plain Managment

Storm Water Drainage

Structural Flood Control Works

Dams and Reservoirs

Dikes, Levees and Floodwalls

Channel Alterations

High Flow Diversions

On-Site Detention Measures

Discussion:

The State Highway Administration (SHA) performs flood hazard mitigation activities through the responsibilities for design and location of services and utilities. This responsibility extends to any structure or area owned by SHA:

There are seven district offices with the responsibility of the 23 counties in Maryland as follows:

District Office 1 - Dorchester, Somerset, Wicomico and Worcester Counties;

District Office 2 - Caroline, Cecil, Kent, Queen Annes and Talbot Counties;

District Office 3 - Montgomery and Prince George's Counties;

District Office 4 - Baltimore and Harford Counties;

District Office 5 - Anne Arundel, Calvert, Charles and St. Mary's Counties;

District 6 - Allegany, Garrett and Washington Counties;

and

District 7 - Carroll, Frederick and Howard Counties.

Within SHA, the Bureau of Bridge Design has the responsibility for all box culverts and bridges and the Division of Highway Development has the responsibility for all pipes. SHA has the accountability to develop stormwater management or retention measures for all SHA projects, if it has been determined by the Department of Natural Resources that the project may cause or aid in on-site or downstream flooding hazards, as required through Natural Resources Article 8-905.

State Highway must also comply with the Water Resources Administration "Maryland Interim Watershed Management Policy" of 1977 by following these procedures in making hydrologic computations for State Highway Administration projects:

1. All storm drain systems will be designed by the Rational Method.[1]

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[1]The Rational Method: SHA uses this formula with additional modifications for frequency and intensity. Q is the peak runoff rate (cubic feet per second) at the point of investigation; C is a runoff coefficient representing the ratio of average rainfall to the peak runoff during a period termed the time of concentration, i is the average intensity of rainfall in inches per hour for a duration equal to the time of concentration and for a frequency of recurrence of that rainfall that has been chosen or is required for the design problem under scrutiny; and A is the drainage area in Acres. According to the U. S. Department of Transportation (DOT), the rational method can provide satisfactory peak runoff rates for relatively small areas. There have been varied recommendations for the size limit, however, DOT has recommended that the rational formula be used until the watershed area reaches approximately 500 acres. Maryland uses the Rational Formula for watersheds up to 5 acres and TR-20 for watersheds greater than 5 acres. The lack of a hydrograph here to show concentration over time is the limiting factor for the rational formula. This method of expressing the direct relationship between rainfall and runoff has been in use for the past 50 to 75 years. The traditional formula for this is: $Q = CiA$

2. All storm water facilities draining five (5) acres or less will be designed using the Rational Method.
3. All cross culvert and storm water management facilities for State Highway Administration projects draining more than five (5) acres will be designed using the "United States Soil Conservation Service Hydrograph Method" utilizing the TR-20 computer program.[2]

According to the Policy of Hydrology and Hydraulics, September 1980 (p. 86), prepared by the Division of Highway Development, SHA has a two fold interest in the concept of storm water management. First, as an agency engaged in changing existing land use by the construction of highways, SHA is responsible for the construction of drainage and storm water management facilities that will comply with State laws and regulations. Second, as a downstream property owner, the State Highway Administration must concern itself with the activities of upstream developers whose increased runoff could endanger the highway, and its users.

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[2]TR-20 or Technical Release No. 20 "Computer Program for Project Formulation Hydrology". The Soil Conservation Service recommends use of this technique for more than 400 acres. This program was developed by the Soil Conservation Service to compute surface runoff and route flow through the stream channels and reservoirs thereby developing a hydrograph. When a downstream discharge rate has been established, this program will determine the need of and the size of detention systems through the use of in-flow and out-flow discharges.

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Agency: Maryland Emergency Management and Civil Defense Agency

Flood Hazard Mitigation Responsibility:

. Disaster Preparedness and Assistance

Information and Edcuation

Discussion:

The Maryland Emergency Management and Civil Defense Agency (formerly Maryland Civil Defense and Preparedness Agency) organization comprises the State Agency and local agencies in Maryland's twenty-three counties and the City of Baltimore. It operates the State Emergency Operating Center in Pikesville and also maintains statewide emergency communications systems throughout the State.

The mission of the Maryland Emergency Management and Civil Defense Agency is the mobilization of all resources, public and private, to save lives, limit damage, and speed recovery in emergency and disaster situations. In accomplishing this mission, emphasis is placed on planning, training, and exercise activities designed to achieve the highest possible level of readiness for the conduct of operations in time of emergency or disaster.

Each local office has a Director, nominated by the County Council (or Baltimore City Council) and approved by the Governor. The State office works with the local Emergency Management offices providing assistance in the operation of their programs.

The Maryland Emergency Management and Civil Defense Agency and its predecessor agencies have been very involved in hazard mitigation activities through the year. Disaster Assistance Plans for the State of Maryland and Maryland's twenty-three counties and the City of Baltimore have been developed. A basic step in the preparation of these Disaster Assistance Plans has involved the identification and analysis of flood and other natural and man-made hazards. The Maryland Emergency Management and Civil Defense Agency and its predecessor agencies also have taken a role in the promotion throughout Maryland of the Federal Flood Insurance Program and the flood warning equipment program of the National Weather Service.

A major objective in the development of the cited Disaster Assistance Plans was to provide for the recognition, reduction, avoidance and mitigation of potential disaster hazards. The Plans contain provisions for pre-disaster assistance to avert or lessen the effects of probable and predictable or imminent disasters before actual occurrence. The Plans also identify measures to be taken to minimize the severity of disasters as well as measures to be taken in carrying out all emergency functions to save lives and to minimize and repair injury and damage resulting from disasters.

The Disaster Assistance Plans also reflect agreements by State and local governments that the natural hazards of the areas in which Federal loans or grants are to be used shall be evaluated,

and that appropriate plans and programs for mitigation of hazards found must be approved by the Director, Federal Disaster Assistance Administration (now an element of the Federal Emergency Management Agency) prior to the receipt of a loan or grant. Further, as a condition of a disaster loan or grant made under the provisions of PL 93-288, the applicant shall agree that any repair or construction to be financed shall be in accordance with applicable standards of safety, decency and sanitation and in conformity with current locally applicable codes, specifications, and standards.

The Maryland Emergency Management and Civil Defense Agency also performs surveillance of all potential disaster situations and, in conjunction or collaboration with responsible Federal agencies, provides local governments with warnings, predictions, and advice or assistance on preparatory measures.

In serious flooding situations, the Maryland Emergency Management and Civil Defense Agency is responsible for the development of a preliminary damage assessment, which is the basis for any request by the Governor to the President for the Declaration of a Major Disaster. A Presidential Declaration of a Major Disaster makes the affected communities eligible for a host of Federal disaster assistance under two programs, public assistance and assistance to individuals and families (Small Business Administration Loans, Individual and Family Grants, etc.)

During a disaster, the Director of the Maryland Emergency Management and Civil Defense Agency functions as the State Coordination officer and is responsible on behalf of the Governor for the coordination of Federal, State and local flood response activities and technical assistance.

Public information activities of the Maryland Emergency Management and Civil Defense Agency also serve hazard mitigation purposes. A wide variety of publications provided by the National Oceanic and Atmospheric Administration's National Weather Service have been given widespread dissemination throughout the State on several occasions. Likewise, the Maryland Emergency Management and Civil Defense Agency has participated in Hurricane Awareness Campaigns initiated by the Federal Emergency Management Agency. TV and radio spots have been provided to mass communications media as a part of these compaigns.

Training activities of the Maryland Emergency Management and Civil Defense Agency have also been oriented toward the accomplishment of the hazard mitigation mission. In March, 1981, the Agency in collaboration with the Water Resources Administration of the Department of Natural Resources, hosted a Hazard Mitigation seminar. This seminar was funded under the State Cooperative Agreement through the Federal Emergency Management Agency. The seminar concentrated on Coastal Flood Hazard Mitigation and was attended by local decision makers from coastal flood-prone areas.

Maryland Emergency Management and Civil Defense Agency is funded through the Federal and State government. The 50% Federal share covers personnel and administrative costs. The State funds other costs through the remaining 50% share.

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Publications:

State of Maryland, Disaster Assistance Plan September, 1975.

State of Maryland Hazard Mitigation Plan Maryland Emergency Management and Civil Defense Agency and Water Resources Administration, Department of Natural Resources, January, 1980.

Agency: University of Maryland

Department of Civil Engineering

Flood Hazard Mitigation Responsibility:

Information and Education

Research

Discussion:

The Civil Engineering Department of the University of Maryland serves as a research, information, and education source on flood hazard mitigation.

Presently, there are two on-going research studies which incorporate flood hazard mitigation. The first, a contract funded by the State Highway Administration, is being finalized. The objective of this study to develop a hydrologic model for sizing drainage systems, including detention storage for small watersheds. The second contract, funded by the Tidewater Administration, DNR, is a study of stormwater control policies and stormwater management techniques for low relief areas, i.e. the Eastern Shore. This research project arose out of a perceived need for a comprehensive stormwater management program specifically oriented toward coastal areas.

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# APPENDIX B

TABLE OF CONTENTS

APPENDIX B - FLOOD HAZARD MITIGATION ACTIVITIES

## INTRODUCTION

Flood hazard mitigation encompasses a wide range of activities which draw upon the participation of a large number of agencies, local municipalities and individuals. These activities can be implemented before, during and after a flood disaster has occurred.

For the basis of this report these "flood hazard mitigation activities" have been divided into six major areas:

1. Disaster Preparedness and Assistance
2. Non-Structural Flood Damage Reduction Measures
3. Structural Flood Control Works
4. Development and Redevelopment Policies
5. Information
6. Education

These activities contain the wide variety of flood hazard mitigation measures which are currently used and can be employed in reducing flood damages. With the exception of Disaster Preparedness and Assistance (which includes measures for pre-disaster planning as well as disaster response and recovery) all of the other activities provide a flood damage reduction benefit primarily through application before a flood has occurred. However, after a flooding situation, they can be applied and instituted with respect to the recent flood damage to prevent similiar situations in the future.

These activities and their role in flood damage reduction provide the basis for the importance of a comprehensive program at the State level encompassing all of these activities in light of each other. This requires close coordination and communication between all individuals and groups involved in the implementation of these activities.

These activities are elaborated further in the following discussion.

A. DISASTER PREPAREDNESS AND ASSISTANCE

Disaster preparedness and assistance should form the foundation for local and regional emergency preparedness plans and programs for disaster mitigation, warning, emergency operations and rehabilitation. The success of this preparedness and assistance is dependent upon planning prior to flood disasters. This allows for a smooth implementation of these activities when a flood disaster has occured. Flood forecasting, warning systems and evacuation plans; flood emergency measures; and post-flood recovery all provide essential elements for a strong disaster preparedness and assistance program.

1. Flood Forecasting, Warning Systems and Evacuation Plans

A community preparedness plan should include flood forecasting, warning systems and evacuation plans to provide flood damage reduction. Effective dissemination of information to the public, and adequate response time may save lives and reduce property damages. Two operational flood warning systems (Howard and Baltimore County) which exist at the

County level in Maryland are discussed in Appendix A.

On the national level, the National Weather Service (NWS) of the National Oceanic and Atmospheric Administration (NOAA) has the responsibility to prepare official forecasts and issue public warnings for floods in all areas of the country except for those administered by the Tennessee Valley Authority. Local communities must coordinate with the NWS in the operation of their flood warning systems.

For prediction and warning purposes, NWS classifies floods in two types:

a. "Floods" which develop and crest within approximately six hours or greater (more prevalent in Maryland), and

b. "flash floods" which crest more quickly.

A further discussion on NWS is found in Appendix A. (Given Maryland's geographic topography, "floods" are more prevalent).

2. Flood Emergency Measures

Flood emergency measures, including contingency and emergency floodproofing, can be completed in anticipation of flooding for areas where flood warning time permits these precautions.

Sandbagging is one means of adding a few feet to the effective height of existing levees for additional temporary protection. It can also be

used to create a temporary protective barrier at unprotected low points. Flashboards or other structural devices for providing temporary additional elevation may be feasible on floodwalls or in limited specified areas. Emergency pumping may be necessary to maintain satisfactory interior drainage behind levees or to remove water from basements or other limited areas where water that is normally drainable may accumulate during floods.

The usefulness of flood emergency measures can be enhanced by advance preparation of flood emergency manuals which identify responsibility and capability of organizations and specific individuals who can help in flood emergencies. This should also be included in the local community preparedness plan.

3. Post-flood Recovery

Post-flood recovery provides short term and long term recovery measures to mitigate losses stemming from a flood disaster. To be effective, these measures should be integrated into a local community disaster response plan. Common types of post-flood recovery measures include restoration of public facilities and services, donations of food and clothing, grants, and loans and tax adjustments. These may be supplied by Federal, State and local governments as well as private organizations.

Although relief does not directly reduce flood losses, it does reduce the overall loss impact by shortening the period of disruption and by accelerating the rate of recovery.

Post-flood relief may be counterproductive if aid is used to rebuild exactly what existed before. It is, therefore, essential to reconstruct in a way that will minimize future flood exposure. A discussion on agencies in the State of Maryland which provide post-flood relief is found in Appendix A.

## B. NON-STRUCTURAL FLOOD DAMAGE REDUCTION MEASURES

Non-structural flood damage reduction measures are used to reduce flood damages through activities which do not place emphasis on engineering or structural projects. Historically, flood damage reduction has been achieved through structural measures such as dams, dikes, levees and channel improvements. However, increasing development along with increased expenditure of public funds for flood control works and rising flood losses has caused more attention to be directed to non-structural measures.

Flood insurance, acquisition and flood proofing are considered as primary non-structural flood damage reduction measures.

### 1. Flood Insurance

Flood insurance is a technique to spread the cost of flood losses both over time and over a relatively large number of similarly exposed risks. Until the creation of the National Flood Insurance Program in 1968, flood insurance had not been available from the private sector since the 1920's.

The National Flood Insurance Program (NFIP) not only serves as a program for insurance claims, but encompasses flood plain regulation, floodproofing and land acquisition.

The NFIP is administered by the Federal Emergency and Management Agency. (See FEMA Discussion, Appendix A).

The State serves as the coordinator for local communities by disseminating information and assisting FEMA in implementing the program at the local level.

2. Acquisition

Acquisition of flood prone properties is a useful tool in flood hazard mitigation for reducing future flood damages, by removing the structure which is continually damaged, and protecting the natural value of the flood plain by restoring the property to its natural state. This technique has been receiving increased public attention in recent years. An understand of acquisition requires attention to both the advantages and the disadvantages.

The most important advantages of acquisition are:

a. the correction of past mistakes of flood plain use;

b. provision of more complete and permanent protection than other measures;

c. achievement of multiple flood plain management objectives, i.e., the flow carrying capacity of the stream can be expanded, causing a reduction in upstream flood peaks, and the flood storage area can be increased resulting in reduced downstream flood peaks; and

d. provide for the public use of acquired land.

The disadvantages of acquisition are:

a. landowner objections especially if condemnation is used;

b. high costs associated with the purchase of land;

c. difficulty in acquiring adequate funding;

d. difficulty in coordinating assistance;

e. loss of property tax revenue; and

f. the need for public management of the acquired lands.

Acquisition is expecially useful in reducing flood loss situations where land and structures are subject to frequent and severe flooding, where structures and land occupy needed flood storage areas and when structures and land are severely damaged during a flood. In addition, acquisition can be effective in preventing future flood losses by maintaining flood plain and wetlands in their natural state. This also has importance in the preservation of the natural ecological characteristics of flood plains and wetlands.

3. Floodproofing

Floodproofing is site specific and is dependent on the responsibility of the owner of the structure. However, government entities can encourage and promote floodproofing by establishing building construction requirements and by providing technical assistance. Floodproofing can reduce flood damages for existing

development in lower risk flood plain areas.

Common floodproofing measures, as described in the current Army Corps of Engineers Handbook (1972), include:

a. the installation of water-tight windows and door closures;
b. provisions for the emergency operation of electricity, water and sanitary services;
c. provisions for moving damageable contents to higher levels;
d. sealing walls and foundations against seepage;
e. strengthening walls to resist hydrostatic pressure loads;
f. installation of drain sumps and pumps; and
g. elevation of structures or open columns.

The first three floodproofing measures are dependent upon the receipt of a flood warning (which exemplifies the important of coordination).

Floodproofing can generate a false sense of security, thereby increasing residual losses. When applied to structurally unsound buildings, it can result in more damage than could occur without floodproofing. It is therefore very important to provide strong technical input in the application of floodproofing techniques.

## C. STRUCTURAL FLOOD CONTROL WORKS

Structural flood control works can cause changes in the volume of runoff, the peak stage of the flood, the time of rise and duration of the flood waters, the extent of the area flooded, or the velocity and depth of the flood waters. In addition, these stream changes affect the amount of debris and pollutants that floods carry.

These structural works may include dams and resevoirs; dikes, levees and floodwalls; channel alterations and diversions; high flow diversions; and land treatment, stablization and on-site detention.

Structural flood control works are the traditional response to protect property and save lives from flood hazards. However, these projects often have high operating and maintenance costs and therefore may not be appropriate in all situations.

### 1. Dams and Reservoirs

Dams and reservoirs can cause a broad range of flood modifying effects such as: reduction in the flood flow rate, the extent of the area flooded, timing, etc. Dams and reservoirs also serve multiple-purpose uses that more localized measures may not achieve. Historically dams, reservoirs and levees have been viewed as the only effective

means of flood mitigation. In recent years, more objections have been raised against the use of such structural devices because of possible environmental degradation as well as the need for and expense of continuous operation and maintenance.

2. Dikes, Levees and Floodwalls

Dikes, levees and floodwalls protect a portion of the flood plain from flooding up to the design level of the structure. They can provide adverse and beneficial effects. They can increase the height of the flood upstream, across the stream and downstream by reducing the amount of flood plain area available for for overbank floodwater storage.

Upon receipt of a flood forecast, the temporary construction of dikes and levees may provide emergency flood protection measures. These emergency flood measures are based upon an effective flood warning system and must be integrated into the community emergency preparedness plan.

3. Channel Alterations and Diversions

Channel alterations may deepen, widen or straighten the channel or remove obstructions to enhance the capacity of the stream channel to carry higher volume flows. This channel change reduces the height, extent, or duration of overflow of flood waters to the flood plain. Because channel alterations can accelerate the quantity and/or

velocity of flow through an area, this may increase flooding downstream as well as reduce natural stream valley storage. High maintenance costs are usually associated with channel alterations unless the channel and stream banks are stable.

High flow diversions redirect excess flows away from developed areas using natural or artificially constructed bypass channels or conduits. Some flow diversions may be environmentally beneficial by minimizing the destruction of the land-water interface in the natural stream channel; however, negative environmental effects may occur through the alteration of downstream flow patterns and discharges.

4. Land Treatment, Stabilization, and On-Site Detention

Land treatment and stabilization can be accomplished through structural measures such as grade stabilization, channel improvements and the construction of small dams. The prevention of forest fires in rural areas and the restoration of ground cover by seeding, cropping and terracing also provide stabilization. These measures can also reduce soil erosion thereby preventing large quantities of sediment and pollutants from being carried downstream.

In urban areas, land treatment and stabilization may be referred to as on-site detention measures or storm water management, accomplished by the temporary storage of urban runoff. The period of runoff is extended with the intent of reducing flood peaks. The temporary storage of runoff may also result in an increased infiltration rate. To be effective, these on-site detention measures require continuous maintenance. A thorough knowledge of the drainage area must be acquired to determine the area a structure should serve and the effects of the resultant detention on the timing of the runoff in different segments of the watershed. Without this understanding and knowledge, stormwater management structures may not be effective. They may even cause more problems if the timing of the runoff increases flow downstream. There is a need for more research in this area to clarify the effectiveness of existing state of the art storm water management structures.

## D. DEVELOPMENT AND REDEVELOPMENT POLICIES

Development and redevelopment policies can modify susceptibility to flood damage and guide development in a manner which takes into account the flood hazard and the natural characteristics of the flood plain. These policies may be applied at the local, State and Federal level through flood plain management; storm water drainage practices; and recreation, and open space planning.

### 1. Flood Plain Management

Flood plain management may be an effective means of reducing flood losses as well as increasing the net benefits from flood plain use by regulating and designating appropriate uses to prevent unwise flood plain occupancy.

A combination of tools can be utilized in land use management for flood plains, especially regulations, redevelopment policies and land use planning. Land use regulations become effective through State or local community action. These regulations must be based on technical data which provides a hydrologic and hydraulic analysis of the watershed as well as social and economic analysis.

Regulations should be equitably applied and should permit reasonable use of the land, though not the highest economic short term return.

The design and location of services and utilities may reduce flood loss potential by guiding private and public development (public services and utilities) to low risk areas or areas not subject to flooding. This could include the prevention of extending roads or sewer and water mains or their access in flood hazard areas, the location of public buildings away from flood hazard areas and State and local agencies imposing conditions on loans, grants and permits in order to restrict service in flood hazard areas.

Redevelopment can serve as a tool for improving flood plain areas; however, this should include a coordination of disaster assistance, urban redevelopment, economic development, flood insurance and other community development activities.

Land use planning can operate at the State and local level. For example, at the State level, general legislation can establish flood plain planning programs that provide the basic guidelines and provisions for local implementation of flood plain regulations. In Maryland, the Flood Hazard Management Act of 1976 is such a tool. The State of Maryland also offers advice, assistance, and a model ordinance for the implementation of the Flood Hazard Management Act and the National Flood

Insurance Program. Maryland also has a regulatory permit program for construction in the State's 100-year flood plains. (For more information on these land use programs, refer to the WRA discussion in Appendix A.)

2. Storm Water Drainage Practices

Storm water drainage practices may provide planning and regulatory requirements to reduce the hydrologic impacts of development on stream systems. Measures may also be included to protect water quality, reduce stream erosion, prevent increases in flood levels and frequency, or to maintain the groundwater level by retaining natural soil surfaces which allow the infiltration of rainwater.

The dense development of urbanized areas often necessitates the need for drainage regulations. Unfortunately, little research exists on the efficiency of drainage projects and only large urban areas have the resources capable of supporting adequate competent staffs to formulate drainage regulations based on hydrologic and hydraulic analysis.

The Flood Hazard Management Act calls for attention to drainage considerations in the development of the flood management plan. (See the WRA discussion in Appendix A).

3. Recreation and Open Space Planning

The use of flood plain lands for recreation and open space represents beneficial public use of flood prone lands. Recreation and open space use retains land in a state which minimizes future flood damages while preserving natural values. Parklands offer multiple use objectives in providing recreational lands for public use and the potential for a reduction of future flood damages.

E. RESEARCH

The development of a strong technical data base is essential in an effective flood hazard mitigation program. This information should be available for use by local planners, local officials and others who interact with any aspect of flood hazard mitigation. This should include the hydrology and hydraulics of varied sizes of watersheds, resource attributes of flood plains, the potential impact of land use decisions on expected flooding, flood plain management approaches and emergency flood measures.

## F. INFORMATION AND EDUCATION

Information on floods and flooding hazards is a prerequisite for reducing flood damages. Public education provides increased awareness of the physical process of flooding and solutions for reducing flood damages.

# APPENDIX C

TABLE OF CONTENTS

APPENDIX C - PERTINENT FLOOD LEGISLATION

July 1, 1981

# FLOOD HAZARD MANAGEMENT ACT OF 1976

(including amendments effective July 1, 1981)

Article - Natural Resources

8-9A-01.

(a) In this subtitle, the following terms have the meanings indicated.

(b) "Area of nontidal inundation" means an area within the State which is subject to inundation caused predominately by accumulated surface runoff or excess rainfall runoff, or both.

(c) "Area of tidal inundation" means an area within the State which is subject to inundation caused predominately by tides or wind-driven waters, or both.

(d) "Department" means the Department of Natural Resources.

(e) "Federal flood insurance program" means the program established by the National Flood Insurance Act of 1968, as amended.

(f) "Flood hazard area" means an area of tidal or nontidal inundation resulting from a 100-year flood event and established pursuant to the provisions of 8-9A-03.

(g) "100-year flood event" or "100-year flood" means a flood that has a 1 percent chance of being equalled or exceeded in any given year.

(h) "Secretary" means the Secretary of Natural Resources.

(i) "Subdivision" means any county, including Baltimore City. The term "subdivision" also means any incorporated municipality which has the authority to adopt and enforce land use and control, measures for the areas within its jurisdiction.

8-9A-02.

(a) The General Assembly finds and declares that (1) recurrent flooding of a portion of the State's land resources causes loss of life, damage to property, disruption of commerce and governmental

services, and unsanitary conditions, all of which are detrimental to the health, safety, welfare, and property of the occupants of flood hazard areas of the State; (2) considerable public costs are incurred through the emergency preparedness program, and by replacing public utilities and other public capital investments destroyed or damaged by floods; (3) flood waters disregard jurisdictional boundaries; and (4) the public interest necessitates management of waters and flood hazard areas for the objectives of preventing and alleviating flood threats to life and health, reducing private and public economic losses, and to the extent possible, preserving the biological values associated with these land and water resources.

(b) The policy and purposes of this subtitle are to assist in the guidance of the development to minimize the impacts of flooding; to provide State guidelines and technical assistance to local governments in management of flood hazard areas; to provide for comprehensive watershed management; to facilitate implementation of projects for flood control; to encourage and provide for local governmental units to manage flood-prone lands in a comprehensive manner; to provide for the biological and environmental quality of the watersheds of the State; and to establish a grant program to assist local jurisdictions with implementation of those capital projects included within the comprehensive flood management plans which are adopted and approved in accordance with the subtitle.

8-9A-03.

(a) By January 1, 1982, the Department, after consultation with and consideration of recommendations submitted by subdivisions and the Departments of State Planning and Agriculture, shall designate a priority list of watersheds for the purpose of flood control planning and management and establish a schedule for completion of studies of these watersheds.

(b) By July 1, 1983, the Department, in cooperation with the subdivisions and the Departments of State Planning and Agriculture, shall conduct studies of the watersheds designated pursuant to subsection (a) which shall define at least (1) the existing magnitude and frequency of flood events, (2) the magnitude and frequency of flood events based on planned development, and (3) alternative management techniques according to their effectiveness in controlling floods and minimizing flood damage. The studies shall address at least the 100-year flood event. By mutual agreement, the Department may delegate the responsibility for carrying out all or part of the studies of priority watersheds to the appropriate subdivisions.

(c) As a part of the study undertaken under subsection (b), the Department shall delineate the flood hazard areas on maps showing areas of tidal and nontidal inundation.

(d) By July 1, 1984 each subdivision, in cooperation with the departments of Natural Resources, State Planning, Agriculture, and other appropriate State agencies shall prepare a flood management plan based upon an evaluation of the alternative management techniques and other findings included in studies conducted under subsection (b). Each flood management plan shall be consistent with the purposes and provisions of this subtitle.

Management techniques may include:

(1) Flood control dams;

(2) Levees and dikes;

(3) Stormwater detention or retention structures;

(4) Flood warning systems;

(5) Public acquisition;

(6) Flood proofing;

(7) Storm drain and stream maintenance;

(8) Tax adjustment policies;

(9) Subdivision, zoning, and related ordinances; and

(10) Other practical methods.

(e) In any interjurisdictional watershed, those portions of the flood management plans of the subdivisions relating to the watershed shall be subject to review and approval by the Department as one plan. Any comprehensive flood management plan which includes a project for which grant funds are requested under this section is subject to review and approval by the Department. If a plan is disapproved, the Secretary shall set forth in writing the reason for disapproval. Disapproval of a plan shall be based only on flood management considerations.

(f) The Department and the subdivisions shall coordinate activities under this section with all related programs including the national flood insurance program, the sediment control program, and the State water pollution control and abatement programs.

(g) Each subdivision shall implement the flood management plan for its watershed. If a subdivision so elects, the Department, in consultation with the subdivision, shall prepare the rules and regulations to implement the flood management plan. The subdivision shall adopt these rules and regulations. If a municipality elects, and the county agrees, the county, in consultation with the municipality, shall prepare the rules and regulations. If the county does not agree, the Department, in consultation with the municipality, shall prepare, if requested, the rules and regulations. The municipality shall adopt the rules and regulations prepared for it. Implementation of the flood management plans shall begin within one year after they are completed.

(h) There is a comprehensive flood management grant program within the Department of Natural Resources.

(1) Subject to the approval of the Board of Public Works, the Department may use proceeds from the State debt created to fund the comprehensive flood management grant program for studies pursuant to subsection (b). The Department may provide grants to subdivisions for watershed studies when they are delegated that responsibility pursuant to subsection (b).

(2) Subject to the approval of the Board of Public Works, the Department may provide grants to subdivisions for flood control and watershed management capital projects, provided that the projects are consistent with the plans and implementation prepared and adopted in accordance with this subtitle, and provided further that each flood control and watershed management capital project:

(i) is undertaken as part of a comprehensive flood management plan prepared and adopted by the subdivision; and

(ii) is not inconsistent with any state or interjurisdictional flood management plan.

(3) The amount of any grant made by the Department shall be matched by a minimum amount of 50 percent of local funds for a project. The Department may provide up to 50 percent of the nonfederal share of the funding for a project which meets the criteria of this subtitle.

(4) To receive a grant, the subdivision must participate in the national flood insurance program.

(5) Before making a grant, the Department, in cooperation with the Department of State Planning, shall review the flood control and watershed management operations of the applicant subdivision to assure that they are in compliance with this subtitle.

(6) The Department, in consultation with the Department of State Planning, shall promulgate rules and regulations necessary for the administration of the grant program. These rules and regulations may include:

(i) A determination of statewide and interjurisdictional needs and priorities;

(ii) Standards of eligibility for applicants and projects;

(iii) Criteria for recognition of tidal and nontidal areas;

(iv) Engineering and economic standards and alternatives; and

(v) Procedures for filing and processing contents of applications..

(7) Each project application shall be submitted to and reviewed by the State clearinghouse of the Department of State Planning in accordance with established clearinghouse procedures.

8-9A-04.

(a) The Department shall assure that State construction projects and State-assisted construction projects meet the requirements of this subtitle.

(b) The Department shall evaluate the effects of changes in the character of the watersheds. In order to assist the Department, the subdivisions shall provide the Department with information on local development, changes in land use, and other physical changes. The Department is the depository for all flood-related data and activities with regard to the provisions of 8-9A-03.

(c) The Department periodically shall review the maps of flood hazard areas and local activities undertaken pursuant to this subtitle to determine whether its provisions are being adhered to.

(d) The Department shall report every two years to the Governor and General Assembly on January 1 concerning the progress of the implementation of this subtitle. The report may contain recommendations for (1) improvements to the subtitle, (2) actions needed to improve implementation of the subtitle, and (3) amendments to the flood hazard area maps.

8-9A-05.

(a) Each subdivision shall take measures to enforce the provisions of this subtitle within its jurisdiction, including the enactment of a local law prescribing a civil penalty in the form of a fine not exceeding $500 for

each day of violation of any local law it enacts to implement this subtitle. The local law shall provide that each day upon which a violation occurs or continues constitutes a separate offense. The local law shall provide that the total civil penalty may not exceed $10,000.

(b) If a subdivision fails to enforce any provision of this subtitle, including any ordinance or local law the subdivision enacts pursuant to it, or if the subdivision does not possess the authority to correct a violation of this subtitle, the Department may request the Attorney General to take appropriate legal action to correct the violation.

(c) A court exercising equity jurisdiction in the county where the land or any part of the land or water covered by this subtitle is located may restrain any violation of this subtitle, or order the abatement of a condition resulting from any violation and order the restoration of lands and waters to the condition existing prior to the violation, in an action brought by a subdivision affected by the violation, by the Department by any authorized unit or officer of the Department, or by the Attorney General.

8-9A-06.

By mutual agreement, the Department may delegate all or part of its responsibilities under this subtitle to a subdivision if the Department determines that the subdivision has the technical and financial resources to fulfill the responsibilities to be delegated.

8-9A-07.

The provisions of this subtitle concerning the authorities of the Department and the subdivisions of the State with respect to flood hazard management are in addition to any other provision of law.

8-9A-08.

Engineering, technical and administrative services required to implement the provisions of this subtitle shall be funded as provided in the State budget.

8-9A-09.

This subtitle may be cited as the Flood Hazard Management Act of 1976.

Effective date: September 14, 1981

# Title 08
# DEPARTMENT OF NATURAL RESOURCES

## Subtitle 05 WATER RESOURCES ADMINISTRATION

### 08.05.08 Flood Management Grant Program

Authority: Natural Resources Article, § 8-9A03(b)(5), Annotated Code of Maryland

.01 Definitions

A. In these regulations the following terms have the meanings indicated. Terms not defined below shall have the meanings given to them in the relevant statutes or, if not, defined in statutes, the meaning attributed by common use. The terms "department", "federal flood insurance program", 100-year flood event", and "subdivision" are defined in the Natural Resources Article, Annotated Code of Maryland. The definitions for these terms are provided below as a convenience, but persons affected by the Department's regulations should be aware that these definitions are subject to amendment by the General Assembly.

B. Terms Defined.

(1) "Administration" means the Water Resources Administration.

(2) "Capital project" means any flood control or watershed management capital project which:

(a) Reduces flood hazards;
(b) Has an expected useful life of at least 15 years;
(c) May include public acquistion or structural methods; and

(d) Does not include the following associated elements of any project:

(i) Research,
(ii) Planning,
(iii) Study,
(iv) Operation,
( v) Repair, or
(vi) Maintenance.

(3) "Department" means the Department of Natural Resources.

(4) "Flood management plan" means a plan to guide activities in a watershed for the purpose of minimizing the hazards of flooding and preserving the biological values associated with the land and water resources, pursuant to Natural Resources Article §§ 8-9A-01 et seq.

(5) "Federal flood insurance program" means the program established by the National Flood Insurance Act of 1968, as amended.

(6) "100-year flood event" or "100-year flood" means a flood that has a 1-percent chance of being equalled or exceeded in any given year.

(7) "Subdivision" means any county, including Baltimore City. The term "subdivision" also means any incorporated municipality which has the authority to adopt and enforce land use and control measures for the areas within its jurisdiction.

(8) "Ultimate development" means the anticipated development during the expected useful life of the capital project.

.02 General Requirements

A. Establishment of an annual State priority list for capital projects. Before January 1, 1982 and before the first of January after that, each participating subdivision shall submit applications, in priority order, for capital projects which are included in approved flood management plans to the Administration. Upon review and evaluation of the submitted capital projects an annual State priority list shall be adopted by the Administration. This list will be the basis for grants to the subdivisions and will specify the Department's share of the eligible project cost.

B. Adoption of the Annual Priority List. Before adopting the annual State priority list, the Administration shall notify the affected subdivisions of its intended action and afford reasonable opportunity for comment. The approval of a flood management plan does not determine the position of a capital project on the priority list.

C. Criteria for Priorities

(1) The purpose of ranking the individual capital projects in the State priority list is to ensure the greatest benefits from the investment of public money. The ranking will be based on the type of capital project, flood history, and cost effectiveness and implementation schedule of the flood management plan.

(2) The types of capital projects which will be preferred shall:

(a) Be permanent solutions to existing flood hazards and not require continuing operation, maintenance, or repair; and

(b) Minimize environmental impacts.

(3) Flood history will consider the:

(a) Magnitude and frequency of past flood events;

(b) Damages resulting from past flood events; and

(c) Danger to public health and welfare.

(4) The cost effectiveness will consider the:

(a) Cost of the capital project and total cost of the flood management plan;

(b) Direct damages prevented.

(c) Indirect costs prevented such as work closings, environmental damage or personal inconvenience.

(d) Benefits created such as recreational opportunities, open space, ecological enhancement, hydrologic improvements, water quality improvements or water supply; and

(e) Life of the project and possibility of future expenditures such as maintenance, repair, or replacement.

D. All land acquired must be dedicated to open space or recreation.

E. These regulations establish procedures for the implementation of the Maryland Flood Management Grant Program and are not intended to create procedural or substantive rights in any person except the Department of Natural Resources.

.03 Applications for a Grant

A. Scope. Subdivisions may apply to the Administration for grants to assist in flood control and watershed management capital projects if all the following conditions are met:

(1) It has the authority to make an application and has been authorized by an official act of the governing body directing this action. If the applicant is other than a county or Baltimore City, it must provide written certification from its legal counsel that it is a subdivision as defined in Regulation 01 B(7).

(2) It will have funds available to meet its share of the capital project.

(3) It is participating in and is in conformance with the federal flood insurance program.

(4) The capital project is part of a flood management plan approved by the Administration and adopted by the subdivision pursuant to Natural Resources Article, §§ 8-9A-01 et seq.

B. All applications to the administration shall:

(1) Reference the approved and adopted flood management plan of which the capital project is a part;

(2) Specify the exact location of the capital project;

(3) Specify the anticipated results of the capital project and furnish any substantiation required by the Administration;

(4) Evaluate alternative management techniques;

(5) Specify the operation and maintenance arrangements for the life of the project.

(6) Specify the use of disposition of acquired property.

(7) Specify the expected useful life of the project;

(8) Identify the short-term and long-term beneficial and adverse environmental effects of the capital project and any mitigating measures for the adverse impacts.

(9) Identify all beneficiaries and the estimated current dollar value of the benefits and costs of the capital project;

(10) Certify that the value or interest in properties proposed for acquisition will be established by two qualified appraisers prior to implementation; and

(11) List all necessary federal, State, and local permits and certify that all these permits have been or will be applied for and will be obtained before implementation of the capital project.

C. Unless otherwise specified, all hydrologic calculations shall be based on the ultimate development of the watershed. If the project requires computations of flood frequencies and flows the methods and computations must be available in sufficient detail for the Administration to determine their validity.

D. The approval of a capital project for a grant does not waive the requirements for any applicable State permits. If the capital project requires a permit from the Administration, detailed information need not be duplicated. A statement on the grant application that the information is available in the permit application will be sufficient.

E. All applications and information required by these regulations shall be submitted to the Administration, in a manner and form acceptable to the Administration, before the Administration takes final action on the application.

F. The application shall be submitted by the applicant to the Maryland State Clearinghouse in accordance with standard Clearinghouse procedures as described by the Department of State Planning. The standard Clearinghouse procedures are based on the provision of OMB Circular A-95 and the application is subject to the applicable requirements and procedures contained in the Circular. Final action shall not be taken by the Administration until the State Clearinghouse response has been received by the Administration.

G. The chief executive officer of the subdivision shall sign the application.

.04 Flood Management Plans

A. Flood management plans are to guide activities in a watershed so that flood hazards are minimized while preserving the biological values associated with the land and water resources. They will be developed for each watershed in accordance with Natural Resources Article, §§ 8-9A-01 et seq. to attain all the following goals:

(1) Reduction of existing flood hazards;

(2) Prevention of future flood hazards;

(3) Adequate emergency preparedness;

(4) Preservation of the environmental qualities of the watershed; and

(5) Reduction of economic and social losses.

B. A flood management plan shall contain, but not be limited to, the following:

(1) The limits of the watershed;

(2) An inventory of historic flood damage sites, including frequency and damage estimates;

(3) An inventory of areas of significant natural resource value as noted in existing state and local studies;

(4) An inventory of areas of historical and archeological value identified in existing state and local studies;

(5) A map or series of maps showing features of the watershed pertinent to the flood management plan.

(6) The relationship of the flood management plan to related programs in the watershed including the federal flood insurance program, the sediment control program and the State water pollution and abatement program and Program Open Space.

(7) The following information, based upon the ultimate development of the watershed and flood events up to and including the 100-year flood:

(a) A description of potential flood damages.
(b) An assessment of all available flood mitigation techniques, their costs and hydrologic impacts.
(c) The selected projects and techniques necessary to mitigate flood damages, and
(d) Any environmental, social, and economic implications of the proposed flood mitigation techniques;

(8) A schedule of expected implementation of all capital projects and other pertinent elements of the flood management plan; and

(9) Identification of measures to be taken before, during and immediately after a flood disaster including;

(a) Warning and evacuation for known flood hazard areas, and
(b) Post disaster activities which would minimize both present and future damages.

(10) Any stormwater management requirements and techniques necessary to mitigate the adverse effects of land use changes on stream flows and flood frequencies.

(11) Any rules, regulations or ordinances necessary for implementation and hazard mitigation.

.05 Procedures.

A. General. If the Administration approves a capital project and it falls within the limits of the funds available according to the annual priority list, a proposal for funding the capital project with appropriate conditions will be presented, along with reviews from appropriate agencies, to the Board of Public Works for approval and commitment of funds. No project will be submitted to the Board of Public Works until the subdivision certifies that its share of the funds are available and that it will properly operate and maintain the project to assure that the project benefits are realized.

B. Department's Share of Capital Project Cost. The amount of any grant made by the Department may be up to 50 percent of the funding of a flood management project but may not exceed the amount of local funds. The Department may provide up to 50 percent of the nonfederal share of the funding for a project which meets the criteria of thse regulations and Natural Resources Article §§ 8-9A01 et seq.

C. Recovery of Grant. The Department may investigate inspect, or audit any capital project involving grant funds. If

the Department determines that the capital project is not being performed according to the approved application or flood management plan, the Department may withhold funding and require reimbursement by the subdivision.

MINIMUM STANDARDS FOR PUBLIC AND PRIVATE STRUCTURES

Sec. 406. As a condition of any disaster loan or grant made under the provisions of this Act, the recipient shall agree that any repair or construction to be financed there with shall be in accordance with applicable standards of safety, decency, and sanitation and in conformity with applicable codes, specifications, and standards, and shall furnish such evidence of compliance with this section as may be required by regulation. As a further condition of any loan or grant made under the provisions of this Act, the State or local government shall agree that the natural hazards in the areas in which the proceeds of the grants or loans are to be used shall be evaluated and appropriate action shall be taken to mitigate such hazards, including safe land-use and construction practices, in accordance with standards prescribed or approved by the President after adequate consultation with the appropriate elected officials of general purpose local governments, and the State shall furnish such evidence of compliance with this section as may be required by regulation.